UNITED STATES OF AMERICA:
WAR DEPARTMENT.

MONTHLY WEATHER REVIEW.

(GENERAL WEATHER SERVICE OF THE UNITED STATES.)

SEPTEMBER, 1887.

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PREPARED UNDER THE DIRECTION OF
BRIGADIER GENERAL A. W. GREELY,
CHIEF SIGNAL OFFICER OF THE ARMY,

BY J. MITCHELL,
2D LIEUTENANT, SIGNAL CORPS.

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1887.

List of merchant marine steam and sailing vessels from which International Simultaneous Meteorological reports were received at the Office of the Chief Signal Officer, U. S. Army, Washington, D. C., in time to be used in the preparation of the Weather Review for the month of September, 1887.

Name of vessel.	Captain.
Allan Line.	
Br. s. s. Buenos Ayrean	Capt. J. Scott.
Grecian	C. E. Le Gallias.
Hibernian	J. Brown.
Manitoban	Wm. Dunlap.
Prussian	J. Ambury.
Sarmatian	W. Richardson.
Scandinavian	John Park.
American Line.	
Br. s. s. British King	John Kelly.
British Princess	E. H. Freeth.
Am. Indiana	W. J. Boggs.
Br. Lord Clive	P. Urquhart.
Lord Gough	E. M. Hughes.
Anchor Line.	
Br. s. s. Alastia	J. Brown.
Ancheria	W. Brown.
Australia	A. McRitchie.
Circassia	A. Campbell.
City of Rome	H. Young.
Devonia	W. G. Crockhart.
Dorian	J. McKeague.
Ethiopia	John Wilson.
Furnessia	J. Hadlowick.
Trinacria	G. Mitchell.
Tyrian	Alex. Haig.
Allan Line.	
Br. s. s. Alsatian	J. W. Sanson.
Alsene	K. J. Selders.
Alvens	F. McKay.
Alvo	D. Williams.
Andes	T. M. MacKnight.
Claribel	J. Evans.
Booth's S. S. Co. (limited).	
Br. s. s. Ambrose	E. Bisson.
Augustine	Ralph Harwood.
Basil	H. Thompson.
Bordeaux Steam Navigation Co.	
Fr. s. s. Chateau Yquem	C. F. Journeil.
Bristol-City Line.	
Br. s. s. Brooklyn City	W. Fitt.
Llandaff City	T. H. Gore.
Lincoln	Thos. L. Evans.
Canada Shipping Company.	
Br. s. s. Lake Nepigon	R. Owens.
Cromwell Line.	
Am. s. s. Louisiana	E. V. Gager.
New Orleans	T. P. C. Halsey.
Clyde Line.	
Am. s. s. Tennessee	1st Off. J. C. Norton.
Cunard Line.	
Br. s. s. Aurania	Capt. W. H. P. Haines.
Bothnia	T. Dutton.
Catalonia	Edward Wylie.
Cephalonia	Henry Walker.
Etruria	T. Cook.
Pavonia	A. McKay.
Scythia	T. Roberts.
Servia	H. McKay.
Umbria	W. McMicken.
Fabre Line.	
Fr. s. s. Noustria	P. Verries.
Furness Line.	
Br. s. s. Boston City	T. Davies.
British Crown	A Smith.
British Queen	B. Wills.
Stockholm City	K. Doyle.
General Trans-Atlantic Steamship Co.	
Fr. s. s. La Bourgogne	E. Franguel.
La Bretagne	M. de'Jousselin.
La Champagne	E. Traub
La Gascogne	C. Santelli.
La Normandie	G. de Kerasbiec.
Great Western S. S. Line.	
Br. s. s. Dorset	Ch. Off. E. Crossman.
Oxford	Capt. W. Janes.
Warwick	L. Morice.
Worcester	W. Stamper.
Guion Line.	
Br. s. s. Alaska	Geo. S. Murray.
Arizona	S. Brooks.
Nevada	J. Douglas.
Wisconsin	E. Bentley.
Wyoming	C. L. Rigby.
Hamburg-American Line.	
Ger. s. s. Gellert	W. Kuhlewein.
Gothia	H. Bauer.
Hammonia	C. Hebich
Lessing	H. Barends.
Moravia	O. Penoldt.
Rhaetia	H. Vogelgesang.
Rugia	C. Kordell.
Slavonia	H. Schmidt.
Suevia	C. Ludwig.
Wieland	A. Albers.
Inman Line.	
Br. s. s. City of Chester	A. Lewis.
City of Chicago	Fred Watkins.
City of Richmond	A. Redford.
Am. s. s. Illinois	Geo. W. Dodge.
Ohio	R. W. Sargent.
Johnston Line.	
Br. s. s. Baltimore	J. Trenery.
Nessmore	Geo. Elliott.
Leonard & Holt's Steamship Company.	
Br. s. s. Siris	Frank Graham.
Herschal	Ch. Off. M. Sisters.
Olbers	Capt. James Clarke.

Name of vessel.	Captain.
Leyland Line.	
Br. s. s. Bavarian	Capt. Robt. Leask.
Bulgarian	E. Parry.
Virginian	M. Fitt.
Mallory Line.	
Am. s. s. Alamo	Samuel Risk.
City of San Antonio	J. Wilder.
Carondelet	W. F. Evans.
Colorado	J. Daniel.
Lampasas	M. B. Crowell.
Nueces	J. Bolger.
State of Texas	Gilbert Williams.
Mediterranean and New York S. S. Co.	
Br. s. s. Pontiac	H. W. Brown.
Morgan Line.	
Am. s. s. Eureka	R. B. Quick.
National Line.	
Br. s. s. Canada	J. Robinson.
Denmark	R. S. Rigby.
Egypt	J. Sumner.
England	A. F. Hosley.
Erin	Thos. Foot.
France	A. D. Hadley.
Greece	A. J. Jeffrey.
Helvetia	G. Cochrane.
Holland	Wm. Tyson.
Italy	Wm. Pearce.
Spain	W. A. Griffiths.
The Queen	T. P. Heely.
Navigazione Generale Italiana.	
It. s. s. Gottardo	Domenico Viola.
Letimbro	3d Off. Fr. Diliberto.
New York and Cuba Mail S. S. Co.	
Am. s. s. Cienfuegos	Capt. F. M. Faircloth.
N. Y., Havana & Mexican Mail S. S. Co.	
Am. s. s. City of Alexandria	J. W. Reynolds.
City of Washington	W. M. Rittig.
North German Lloyd Steamship Co.	
Ger. s. s. Aller	H. Christoffers.
America	H. Hincke.
Donau	H. Supmer.
Elder	P. H. Berdrow.
Elbe	G. Meyer.
Ems	Th. Jungst.
Fulda	B. Bingk.
Main	H. Boedeker.
Saale	H. Richter.
Trave	W. Willigerod.
Werra	R. Bussius.
Ocean Steamship Company.	
Am. s. s. City of Augusta	J. W. Catherine.
Occidental and Oriental S. S. Co.	
Br. s. s. Oceanic	John Metcalf.
Old Dominion Steamship Company.	
Am. s. s. Manhattan	Frank Stevens.
Pacific Mail Steamship Company.	
Am. s. s. Acapulco	J. M. Caverly.
City of New York	R. R. Searle.
City of Para	L. Dexter.
Colon	F. Henderson.
Newport	W. G. Shackford.
Quebec Steamship Company.	
Br. s. s. Muriel	G. S. Locke.
Orinoco	James S. Garvin.
Red "D" Line.	
Am. s. s. Philadelphia	Sam. Hess.
Valencia	Wm. Woodrick.
Red Star Line.	
Belg. s. s. Belgenland	W. A. Beynon.
Am. s. s. Illinois	G. H. Dodge.
Belg. Nederland	A. J. Griffin.
Noordland	H. E. Nickels.
Rhynland	J. C. Jamison.
Switzerland	J. Ueberweg.
Vaderland	C. H. Grant.
Waesland	H. Buschmann.
Westernland	Com. W. G. Randle.
Rotterdam Line.	
Dtch. s. s. Edam	Capt. J. H. Taat
P. Caland	F. H. Bonjer.
Leerdam	G. Stenger.
Schiedam	A. Potjer.
Rotterdam	G. J. Vis.
W. A. Scholten	G. Bakker.
Royal Mail Steamship Co.	
Am. s. s. City of Dallas	C. W. Read.
Royal West India Mail Steamship Co.	
Dtch. s. s. Oranje Nassau	J. A. J. Lacroy.
State Line.	
Br. s. s. State of Georgia	G. Moodie.
State of Indiana	A. Ritchie.
State of Nebraska	A. G. Brace.
State of Nevada	J. A. Stewart.
Thingvalla Line.	
Dan. s. s. Geiser	C. W. Möller.
Hekla	A. G. Thomsen.
Iceland	W. Skjodt.
Thingvalla	S. T. H. Laub.
Twin Screw Line.	
Br. s. s. Richmond Hill	A. Hyde.
Tower Hill	F. Archer, R.N.R
Ludgate Hill	2d Off. H. Dumaresq.
Tyne and Wear Steamship Co.	
Br. s. s. City of Newcastle	Capt. R. Townsend.
Union Line.	
Ger. s. s. Amalfi	Julius Bahr.
Australia	G. Franck.
California	O. Winkler.
Marsala	N. Maass.
Polaria	Johannes Schade.

Name of vessel.	Captain.
Union Line—Continued.	
Ger. s. s. Polynesia	Capt. A. Kuhn.
Taormina	G. W. Koch.
United States and Brazil Mail S. S. Co.	
Am. s. s. Advance	James Lord.
Warren Line.	
Br. s. s. Iowa	E. W. Owens.
Kansas	W. Gleig.
Norseman	D. Morris.
White Cross Line.	
Belg. s. s. DeRuyter	J. J. Brarens.
Pieter de Coninck	E. Smit.
White Star Line.	
Br. s. s. Adriatic	I. G. Cameron.
Britannic	H. Parsell.
Celtic	P. J. Irving.
Germanic	Benj. Glendell.
Wilson Line.	
Br. s. s. Buffalo	J. H. Malet.
Chicago	J. W. Jones.
Galileo	R. T. Jones.
Marengo	W. Abbott.
Otranto	W. Rippeth.
Rialto	F Kerr.
Salerno	B. H. Rogers.
Santiago	R. Potter.
Sorrento	F. W. Ouston.
Miscellaneous.	[G. S.
Br. s. s. Auretta	G. W. Read, F. R.
Ben Ledi	S. Adamson.
Bessarabia	2d Off. A. Thomson.
Cervin	Capt. S. Hughson.
Douro	R. S. Branfoot.
Earnmoor	R. J. Grey.
Edith Godden	J. H. Bennett.
Elpis	Frank Burnett.
Elstow	T. Robertson.
Span. Hugo	A. de Mugica.
Ger. India	M. Hulsen.
Br. John Dixon	L. C. Welch.
Kings Cross	C. J. Mills.
Am. Light-ship No. 27	Andrew Jackson.
Br. Ocean Prince	W. J. Milburn.
Pomona	J. Legoe.
Prydian	Moses Parry.
Roseville	J. Dove.
Roxbury Castle	A. Turpin.
Saint Ronans	Henry Campbell.
Straits of Gibraltar	G. Griggs.
Surrey	R Griffiths.
Thornhill	James Wetherell.
Vertumnus	C. E. Cook.
Wylo	T. L. Rogers.
New York Herald Weather Service.	
Br. s. s. Alene	E. J. Selders.
Am. Algiers	J. B. Percy.
Ger. Aller	H. Christoffers.
Br. Arizona	Sam Brooks.
Barracouta	Robert Hubbard.
British Queen	R. Wills.
Am. Caracas	N. M. Hopkins.
Fr. Chateau Lafite	C. Ollivier.
Chateau Marquax	A. Sensine.
City of Puebla	John Deaken.
Br. Egyptian Monarch	John Harrison.
Am. El Monte	J. W. Hawthorn.
El Paso	H. S. Quick.
Knickerbocker	F. Bemble.
Niagara	S. V. Bemis.
Br. Portia	Henry Dawson.
Richmond Hill	A. Hyde.
Samana	W. Taylor.
Tower Hill	F. Archer.
Sailing vessels.	
Br. bk. Ada Peard	Nath'l Hocken.
Abyssinian	John Hughes.
Am Alice	W. G. Kair.
Am. bg. Abbie Clifford	D. W. Storer.
Swed. bk. Arab Steed	C. A. Skantze.
Nor. sp. B. F. Metcalf	E. P. Larsen.
Am. sp. Big Bonanza	C. J. Andrews.
Ger. sp. Carl	T. Hashhagen.
Br. sp. Chas. S. Whitney	Geo. D. Spicer.
Am. schr. Comet	W. A. Aldrich.
Ger. sp. Dakota	N. E. Schäffer.
Aust. bk. Errante	A. G. Nicolich.
Ger. sp. Fidelio	T. H. Schutte.
Nor. bk. Grundloven	O. G. Ellingsen.
Dtch. bk. Helena	T. T. Verbeet.
Nor. bk. Hermon	O. Olsen.
Am. bk. Henry Warner	Paine.
Ger. sp. Ida	Th. Winters.
Swed. bk. Ida	O. Carlsson.
Br. Iveline	Adam Smith.
Ger. sp. J. W. Gildemeister	A. Lamann.
Am. bg. L. F. Munson	J. V. McKowen.
L. Staples	J. P. Stowers.
Ger bk. Leocadia	John Stohfi.
Br. bk. Mary	Chas. Acocks.
Am. bg. Maneon	E. T. Page.
Am. bk Matthew Baird	J. P. Williams.
Nor. bk. Ovos	G. Olsen.
Ger. bk. Richard	A. von Seggern.
Am. bg. Ruby	A. J. Van Post.
Ger. sp. Shakspere	Carl Muller.
Br. sp. Sapphire	G. W. Murray.
Am. bg. Sarah Doe	B. S. Merryman.
Br. bk. Salina	John Peterson.
Am. bg. Stacy Clark	C. M. Haskell.
Br. sp. Winnifred	R. MacDonald.

UNITED STATES SIGNAL SERVICE

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

This REVIEW treats generally the meteorological conditions of the United States and Canada for September, 1887, and is based upon reports of regular and voluntary observers of both countries. Descriptions of the storms which appeared over the north Atlantic Ocean during the month are also given, and their approximate paths shown on chart i, on which also appears the distribution of icebergs and field ice reported, and the limits of fog-belts to the westward of the fortieth meridian. In tracing the centres of the paths of these storms, data from the reports of two hundred and eighteen vessels have been used. The severest storms of the month over the north Atlantic attended the passage of two cyclones which are traced from northeast of the Windward Islands over the Banks of Newfoundland.

There was an almost entire absence of ice in the vicinity of the Newfoundland Banks, while to the northward of Newfoundland and in the Strait of Belle Isle the aggregate quantity observed slightly exceeded that reported for the preceding month.

Fog was more frequently encountered in the vicinity of Newfoundland than during August, and the southern and eastern limits of the fog-belts are somewhat extended.

The number of areas of low pressure for this month is about the average for September.

The month was warmer than the average September by from 2° to 4° in the Rocky Mountain districts; in the lower Mississippi Valley, west Gulf states, and on the Pacific coast the mean temperature was about normal, while over the greater part of the country east of the Mississippi the month was decidedly colder than the average.

Marked deficiencies in the monthly precipitation occurred in the south Atlantic and west Gulf states. In the Rio Grande Valley, southern plateau, and northern slope the precipitation was decidedly above the average. In all other districts it was near the normal.

In the preparation of this REVIEW the following data, received up to October 20, 1887, have been used, viz., the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and thirty-three Signal Service stations and twenty-three Canadian stations, as telegraphed to this office; one hundred and seventy-two monthly journals and one hundred and sixty-nine monthly means from the former and twenty-three monthly means from the latter; two hundred and eighty monthly registers from voluntary observers; sixty monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports through the co-operation of the "New York Herald Weather Service;" monthly weather reports from the local weather services of Alabama, Illinois, Indiana, Kansas, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New England, New Jersey, North Carolina, Ohio, Oregon, Pennsylvania, South Carolina, and Tennessee; and the Central Pacific Railway Company; trustworthy newspaper extracts, and special reports.

ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean pressure for September, 1887, determined from the tri-daily telegraphic observations of the Signal Service, is shown by isobarometric lines on chart ii.

The range of mean pressure for September, 1887, over the United States is .35, Yuma, Ariz., reporting the least, 29.77, while eastward of the Rocky Mountains four stations, viz., Toledo, Ohio, Washington City, Hatteras, N. C., and Atlantic City, N. J., report a mean of 30.12, the maximum for the month. From chart ii it will be seen that the region of least mean pressure, indicated by the isobar of 29.8, comprises a small area including parts of the southern plateau and south Pacific coast region, and that the mean pressure is greatest over the region extending from the central and upper portions of the Mississippi Valley eastward to the Atlantic coast, there being two areas of barometric maxima shown by the isobar of 30.1—one of which covers a part of the Lake region, and the other the states bordering on the Atlantic from Massachusetts to South Carolina. The barometric means exceed 30.0 in all parts of the country, with the exception of the Rocky Mountain region and Maritime Provinces of Canada.

As compared with the mean pressure of the preceding month, an increase is shown at all Signal Service and Canadian stations, except the following: Fort Canby, Wash., Swift Current and Minnedosa, N. W. T.; at these stations the means for the two months coincide. The increase over the August means is most marked in the middle Rocky Mountain region, and from the lower lakes and New England southward to the Gulf, where it generally ranges from .10 to .15; over the interior portions of the country the increase varies from .05 to .10, and along the Pacific coast from .01 to .05.

The departures from the normal for the various stations are given in the tables of miscellaneous meteorological data; they are also graphically exhibited on chart iii by lines connecting stations of normal or equal abnormal values. The mean pressure for this month is normal or slightly below over the Maritime Provinces of Canada, in the lower Mississippi valley and adjacent states, along the immediate southwestern border from the mouth of the Rio Grande to the Pacific, and in northern California and southern Oregon; in these districts the departures nowhere exceed .03. In all other portions of the country the mean pressure is above the normal, the departures being greatest over the region from the upper Missouri valley eastward to the lower lakes, where they range from .05 to .10.

BAROMETRIC RANGES.

The monthly barometric ranges at the various Signal Service stations are also given in the tables of miscellaneous meteorological data. In the extreme northwest the monthly ranges exceed the normal September ranges by about .2, while on the north Pacific coast they are about .1 less than the normal. At

Brownsville, Tex., an unusual range of 1.16 is reported; this range, which is due to the storm of the 20th–21st, is more than three times as great as the normal (.38) for September at that station. In all other districts the monthly ranges, as compared with the September normal, show no unusual features.

The following are some of the extremes for September, 1887:

Greatest.		Least.	
	Inch.		Inch.
Saint Vincent, Minn.	1.17	San Diego, Cal.	0.22
Rio Grande City, Tex.	1.16	Los Angeles, Cal.	0.25
Fort Totten, Dak.	1.12	Fort Thomas, Ariz.	0.26
Mount Washington, N. H.	1.11	Cedar Keys, Fla.	0.28
Newport, Vt.	1.07	Titusville, Fla.	0.28
Mackinaw City, Mich.	1.06	El Paso, Tex.	0.28
Moorhead, Minn.	1.06	Fort Davis, Tex.	0.28
Portland, Me.	1.03	Key West, Fla.	0.33

AREAS OF HIGH PRESSURE.

Eight areas of high pressure appeared within the limits of stations of observation during this month. September opened with a high area central in northern Virginia, and on the afternoon of the 1st another appeared to the north of Minnesota. The remaining six were first observed on the north Pacific coast. The general direction of movement was to the east, west of the eighty-second meridian, afterwards southeast until the limits of the coast were reached, and subsequently either east or northeast. The centres of paths were, as a rule, north of the forty-fifth parallel until reaching the region over the lower lakes when they trended more to the south. The cold waves which accompanied the passage of high area number v and the last two areas (numbers vii and viii) caused the most destructive frosts of the month, the latter two, especially, severely injuring tobacco and other products.

I.—An area of relatively high pressure, central in northern Virginia, extended on the morning of the 1st from northern Alabama, Georgia, and South Carolina in a northeasterly direction to the Gulf of Saint Lawrence, covering the Maritime Provinces, the New England and middle Atlantic states, the eastern portions of the Ohio Valley and Tennessee, and the northwestern part of the south Atlantic states. During the day the high pressure in the northeast moved rapidly to the east and off the Atlantic coast in advance of a low area which was then moving eastward from Lake Superior, but the southwest portion of the area, moving more slowly in the same direction, remained on the coast until the afternoon of the 2d. This area, whose maximum pressure was less than .2 above the normal, did not present during its passage any special features worthy of note.

II.—A second area first appeared to the north of Minnesota on the afternoon of the 1st. By midnight of the 2d its centre was apparently north of Lake Superior and its southern edge extended over the Lake region. As it slowly advanced southeastward the pressure steadily increased, and on the morning of the 4th the barometer at Rockliffe, Canada, near which the maximum pressure seemed central, was reported as 30.36, or .33 above the normal. The high area at this time extended eastward from the Mississippi River to the Atlantic coast and southward to the Gulf and Florida. During the day it changed its direction more to the southward and moved rapidly, with decreased pressure, to the middle Atlantic states. On the 5th its centre passed beyond the limits of our coast stations and on the 6th the entire area disappeared, apparently continuing its movement to the southeast. In the latter part of the progress southeastward it preceded a low area moving across the Lake region, which advanced so rapidly as to produce moderate gradients of pressure on the 6th, causing dangerous winds both on the upper and lower lakes.

III.—Midnight reports of the 4th indicated an area of pressure above the mean in the eastern portion of Washington Territory which apparently had moved inland from the north Pacific coast. By the morning of the 5th it had extended eastward into northern Idaho and Montana, where it still manifested its presence at the midnight reports, though the pressure had decreased until but slightly above the normal. On the morning of the 6th, however, it had moved southeastward and was central in northwestern Montana, with a maximum pressure of .1 above the normal. By the morning of the 8th it had progressed into Wisconsin, causing light frosts in the northern portions both of that state and Michigan, where the temperature reported at 7 a. m. ranged from 4° to 13° below the mean. It continued to move slowly towards the Atlantic, its general direction being southeast, though from the afternoon of the 7th to the morning of the 8th its mean direction was east, and passed off the coast of the middle Atlantic states on the 9th. Although the maximum pressure throughout the entire path varied only about .1 from the normal, and neither the gradients nor changes in temperature were specially marked, yet its passage across the country to the south of two areas of "low," one preceding and the other succeeding, aided materially, in connection with high areas numbers ii and iii, in causing heavy rains and gales on the Lakes and adjacent regions from the 6th to the 9th, inclusive.

IV.—This area was first observed on the night of the 8th in the northwest off the coasts of Washington Territory and British Columbia. By the morning of the 9th it had moved rapidly inland and was central in British America south of the Saskatchewan River and north of Dakota and Montana. Its subsequent path during the next eight hours was southeasterly into Dakota, where a pressure of 30.32, .4 above the normal, was reported from Bismarck at the afternoon report, and depressions of temperature, both at that station and others in the vicinity, of from 12° to 14° below the average. During the night of the 9th it moved with increased energy northeastward to Lake Superior, causing killing frosts in the northern parts of the upper lake region and reducing the temperature generally throughout the Lake region, upper Mississippi and eastern portion of the Missouri valleys. By the morning of the 11th it had moved eastward and was apparently central near Rockliffe, Canada, where a pressure of 30.50 was reported and a temperature of 34°, 16° below the normal. Killing frost was reported at Northfield, Vt., where the temperature was also 34°. During the next eight hours it moved southeast to the New England coast and, subsequently changing direction to northeast, passed over the Maritime Provinces and disappeared on the 12th from the north Atlantic coast.

V.—The high area which had been stationary on the north Pacific coast since the afternoon of the 9th had, on the morning of the 12th, advanced into western Oregon, where it was central, with a pressure of .25 above the normal. The advance wave of this area crossed the Rocky Mountains during the succeeding night, causing light frosts on the northern slope, but the maximum pressure still remained west of the mountains, central in Oregon. By the afternoon of the 13th the area had partially divided, the eastern wave, with a maximum pressure of .21 above the average, was central in Kansas, and the western, in the north Pacific region, where the highest pressure, 30.30 (.27 above the normal), was reported at Portland, Oregon. On the morning of the 14th the primary area was in motion eastward, and during the next eight hours crossing the northern plateau and Rocky Mountains was central on the northern slope at the afternoon report. Advancing more slowly it crossed into Dakota, where it caused severe frosts during the night, and by the morning of the 15th had united with the secondary area which had been slowly moving northeastward from Kansas towards the lower lakes. The pressure, which was now greatest in northeastern Dakota, where a barometer reading of 30.52 (.56 above the mean) was reported, had increased during the translation of the area and was above the normal over the entire country, except in California, portions of the eastern Gulf and Atlantic states, and New England, and the temperature in Minnesota and Dakota ranged from 4° to 17° below the mean. During the succeeding night as the area moved eastward it caused destructive frosts in the northern portions of Wisconsin and Michigan, and also light frosts in the southern parts of the latter. It advanced steadily, changing its course to southeast as it approached

the Atlantic coast, and on the 19th moved off in advance of high area number vi approaching from the west.

VI.—This high area moved rapidly inland from the coasts of Washington Territory and British Columbia on the night of the 16th, reducing the temperature in Washington Territory from 6° to 18° below the normal, and causing local frosts. On the morning of the 17th the maximum pressure, which was about .17 above the average, was central in northern Montana and the adjacent border of the British Possessions while the area covered the northern slope and extended westward over Idaho and Washington Territory. The pressure increased as its centre progressed eastward north of the Lake region until on the morning of the 19th it ranged, in northern Michigan, from .33 to .44 above the normal. During the succeeding night it changed direction to the southeast and was central over Lake Ontario on the morning of the 20th. Within the next eight hours the maximum pressure decreased about .1. It subsequently moved southeast, with no marked changes in energy, and on the 21st passed off the middle Atlantic coast.

VII.—On the morning of the 19th another high area appeared off the coast of Washington Territory and had by midnight progressed inland so as to cover the northern plateau and north Pacific regions, except the southwestern portion of Oregon. Increasing in pressure it moved slowly across the Rocky Mountains, accompanied by low temperatures and local frosts, and on the morning of the 22d was central north of Dakota. Moving afterwards to the southeast it caused light frosts in Minnesota and portions of the adjoining states on the night of the 22d. On the morning of the 24th the maximum pressure was central in southern Michigan and northern Illinois and numerous frosts were reported both from these states and adjacent portions of others. The temperature reported from that vicinity in some instances fell to 24° below the average, and was below the normal over the entire country east of the Rocky Mountains, except at a few stations in the eastern portions of the northern and middle slopes where the variations from the normal were but slight. Light frost was also reported from Nashville, Tenn., on that morning. During the succeeding night light frosts were reported in Tennessee and Virginia, injuring the tobacco crop at Lynchburg, Va. As the area continued its progress southeastward the pressure decreased, but the low temperatures continued, and on the night of the 25th frosts, which were numerous, especially in the lower lake region, the Ohio Valley, and middle Atlantic states, seriously damaged tobacco and other products. It crossed the middle Atlantic states on the 26th, and apparently passed off afterwards to the northeast, moving in a direction parallel to the coast.

VIII.—Morning reports of the 25th indicated the presence of this high area off the north Pacific coast. Moving southeastward it was central in the northern slope on the morning of the 27th and had caused severe local frosts in that region on the preceding night. Except in portions of the northern and middle plateaus, northern slope, and the north Pacific coast regions the temperature on the morning of the 27th over the entire country was below the normal, and in advance of the low area moving northward from the Gulf copious rains fell east of the ninety-seventh meridian from the 26th, at intervals, up to the close of the month. On the morning of the 28th the centre of the high area was in northern Nebraska and southern Dakota, in which, as also in the adjoining regions, it had caused heavy frosts during the preceding night. Temperatures ranged in some instances from 20° to 24° below the normal in that vicinity. During the next twenty-four hours the pressure rapidly declined under the influence of the low area moving northward in the Mississippi Valley, and by the afternoon of the 29th the high area had entirely disappeared and the barometer fallen to the normal.

AREAS OF LOW PRESSURE.

The paths of eleven low areas have been more or less definitely traced on chart i, dependent upon the information had regarding them. The month is remarkable mainly for the absence of barometric disturbances within the United States, only one depression of any magnitude (number xi) having an extended path within their limits. Five depressions either developed or were first observed in the Saskatchewan Valley. One hurricane moved inland from the Gulf near Brownsville, Tex., and caused much damage generally in that vicinity. One storm moved northeastward from the Rio Grande Valley to the eastern Gulf states and thence northerly, with minor deflections, towards the eastern coast of Lake Superior. One slight depression moved eastward from the shores of Lake Superior. Another entered at the southern coast of Nova Scotia, passed northward to the Saint Lawrence, and thence moved eastward. One low area developed in the middle plateau region, moved northward into the Saskatchewan Valley and subsequently eastward, and another moved from southern California northeastward to the eastern coast of Lake Winnipeg and afterwards apparently eastward. The general course of depressions was eastward, the paths of the majority being in the Saskatchewan Valley, through the British Possessions north of the Lake region, and down the Saint Lawrence Valley.

The following table shows the latitude and longitude in which each area of low pressure was first and last observed and the average hourly velocity of each:

Areas of low pressure.	First observed.		Last observed.		Average progress in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
	° ′	° ′	° ′	° ′	
No. I	47 00	86 00	45 00	62 00	19.0
II	53 00	107 00	49 00	60 00	30.0
III	39 00	117 00	49 00	58 00	36.0
IV	52 30	114 00	52 00	62 00	19.0
V	52 00	116 00	52 00	93 00	21.0
VI	36 00	119 00	49 00	56 00	26.0
VII*	13 00	57 00	26 00	99 00	10.0
VIII	53 00	115 00	52 00	91 00	25.0
IX	52 00	114 00	53 00	99 00	22.0
X	42 00	66 00	52 00	63 00	25.0
XI	28 00	99 00	45 00	86 00	18.0

Average rate of progress, 22.8 miles per hour.

* This storm was evidently the continuation of north Atlantic storm number 5, and its first location and average progress include its ocean path prior to its arrival on the Gulf coast.

I.—The month opened with an area of low pressure covering the middle and southern slopes, extending westward to the Pacific and northeastward, in a narrow belt across the northern limits of the upper Mississippi and Missouri valleys and the upper lake region, into the British Possessions. The temperature east of the Rocky Mountains was above the normal, except in the region bounded by a line running diagonally from the shore of Miramichi Bay along the northern coast of Lakes Erie and Ontario southwestward to the northeast border of the Indian Territory and thence southerly to the Gulf, west of Galveston, Tex. Local rains, generally light, were reported mainly from the Mississippi and Missouri valleys and upper lake region. The minimum pressure remained in the southwest, probably in consequence of the high areas in the east and north, but a secondary depression which on the morning of the 1st was central over the eastern portion of Lake Superior began to move eastward. As it progressed north of the Lakes it was succeeded by an area of high pressure, which caused heavy rains generally on the 2d from the Mississippi River eastward through the Lake region and northern New England. Brisk and also in a few instances high winds dangerous to navigation were reported on the 2d and morning of the 3d from a few of the Lake stations. The depression continued its easterly movement over northern New England and the Maritime Provinces, reaching the coast on the night of the 3d, generally attended by light local rains and fresh to brisk winds.

II.—Afternoon reports of the 5th indicated the presence of a well-defined area of low pressure in the Saskatchewan Valley, north of Montana. Moving southeastward, with increasing energy, it was central over Lake Superior on the afternoon of the 6th, producing heavy rains and gales generally throughout the Lake region. By the morning of the 7th the pressure had still further decreased, the barometer at Rockliffe, Canada,

near the centre of the depression, reading 29.22 at the a. m. report, .81 below the normal. Gales had increased in violence on the Lakes, maxima velocities of forty miles being reported both on Lakes Michigan and Huron, and tornadoes and severe local storms occurred on the afternoon of the 6th and morning of the 7th in southern Michigan and northwestern Ohio, demolishing buildings and damaging property very extensively. The depression subsequently moved down the Saint Lawrence Valley on the 7th and 8th, accompanied by local rains in the lower lakes and the northern portions of the middle Atlantic states and New England, and by the morning of the 9th had passed beyond the limits of the coast. High winds still continued at some Lake ports, owing to the inequalities of pressure due to the movement of this depression, the approach of another low area from the Northwest, and the passage south of the Lakes of a high area towards the east.

III.—The depression which on the morning of the 6th seemed to be located off the coasts of northern California and Oregon had by the afternoon moved inland and become central over Nevada. Influenced by the high pressure then eastward on the mountains, it first moved to the north and subsequently to the northeast, and crossing Idaho and Montana on the afternoon of the 7th passed into the southern Saskatchewan valley. Light local rains fell in the coast regions and eastward, both on the plateaus and mountain slopes; passing to the southeast on the night of the 7th the low area was central in northwestern Dakota and the adjacent region of Montana on the morning of the 8th, with a maximum pressure of 29.50, .43 below the normal. Affected by the high area to its southeast it moved northeastward during the next eight hours, but subsequently trended to the southeast north of the boundary of the United States, and was accompanied in the upper lake region and the valleys westward by light local rains and fresh to brisk winds, occasionally high in the former. After the morning of the 9th, when it was central north of Michigan, its general direction was northeast down the Saint Lawrence Valley, and in its passage it was attended by heavy local rains and gales throughout the Lake region both on the 9th and 10th, and lighter rains eastward towards the Atlantic coast. No marked changes of energy occurred during translation.

IV.—This disturbance first appeared north of Montana, near the sources of the Saskatchewan, on the afternoon of the 9th to the northwest of a high area then in progress eastward. Moving slowly to the southeast, retarded by this high area, on the night of the 10th it changed direction more to the south and passed into northwestern Dakota, where it was central on the morning of the 12th. Heavy rains had fallen during the preceding night in portions of the northern slope, and still continued at a few stations, while numerous light rains were reported both in that region and those adjacent. Afterwards trending to the northeast it passed into Manitoba, with increasing energy, and at the midnight report of the 12th was central near the lakes on its northern border, with a pressure of about .65 below the normal. Rainy and cloudy weather prevailed in Manitoba, eastern Montana, northern Dakota, and from Iowa and Minnesota eastward to the Atlantic coast and the Maritime Provinces. The subsequent general course of this area was northeastward through the British Possessions toward the northern shore of the Gulf of Saint Lawrence, which it reached on the morning of the 15th and afterwards passed beyond the limits of observation. Rains and heavy gales occurred on the Lakes on the 13th and 14th during its progress farther north.

V.—Afternoon reports of the 15th indicated the presence in the western Saskatchewan valley, north of Montana, of another low area in the vicinity but farther to the westward of the region where the preceding depression had been first located. Retarded in its movements by the high area west of the upper lakes, its progress during the next eight hours was slow, but as the high pressure advanced eastward it moved more rapidly and by the afternoon of the 17th was apparently central in the British Possessions east of Lake Winnipeg, its passage so far north being due to higher pressure southward. Its subsequent path could not be definitely traced, though there were evidences both over the Lakes and the Saint Lawrence Valley of the passage of a low area to the northward, which apparently passed eastward north of the Gulf of Saint Lawrence on the night of the 19th. A few high local winds were reported at Lake stations, except from those on Ontario, during the 17th and 18th, but no other features of special interest or importance attended its progress.

VI.—A trough of low pressure was reported in eastern California and southwestern Nevada on the morning of the 17th. During the next twenty-four hours it moved northward, with but feeble energy, and expanded its limits so as to embrace the region from the Colorado River and northern and middle plateaus westward to the Pacific. Influenced by a high pressure which entered from the north Pacific coast and by a high area to the east, the centre contracted, moved to the northeast with increasing energy, and passing into the British Possessions crossed the lakes north of Manitoba. From the night of the 19th its future course appeared to be eastward towards the Gulf of Saint Lawrence, which it reached on the 22d, and during the succeeding night apparently passed over Newfoundland into the Atlantic. Its progress north of the Lakes and the Saint Lawrence River, in conjunction with the high area which followed it farther south, produced numerous local rains from the Missouri Valley eastward over the Lake region and New England and the adjacent states south, and also in the Maritime Provinces. High local winds were reported on the 20th and 21st on the upper lakes and on the 22d from various ports on Lakes Michigan, Huron, and Erie.

VII.—This depression, whose path was almost wholly beyond the limits of observation, was first reported in a telegram to the Chief Signal Officer on the morning of the 16th as a cyclonic disturbance to the southwest of Cuba. Subsequent reports received from marine observers by mail showed, however, that it was first observed in N. 13° 00′, W. 57° 00′. (For additional data, in connection herewith, see description of north Atlantic storm number 5, given elsewhere in this REVIEW.) Twenty-four hours afterwards, with slightly increased energy, it was approximately central on the northeastern coast of Yucatan. The pressure at this time over the United States to the east and south of a line drawn diagonally from the western coast of Lake Superior to Yuma, Ariz., was above the normal, except in portions of the Gulf States and Florida, where the departures from the mean were but very slight. The maximum pressure, nearly .5 above the mean, was central northeast of the lower lakes, the gradients gradually decreasing to the south and west. Another high area had, also, but a few days previously moved off the coast into the north Atlantic, where the pressure was probably considerably above the mean near the coasts of the United States. The high pressure to its north apparently aided materially in determining the path of the cyclone, which approximately moved to the northwestward over the northern portion of the peninsula of Yucatan towards the southern coast of Texas.

By the courtesy of Padre B. Viñes, S. J., Director of the Magnetic and Meteorological Observatory at Belen College, Havana, Cuba, the Chief Signal Officer was notified of the presence of the cyclone in the vicinity of the West Indies, and its subsequent progress through the Gulf. Timely warnings were issued and the public fully apprised, both by the display of signals and the publication of special messages.

The disturbance continued to move slowly in the same general direction during the 17th, 18th, 19th, and 20th, attended by local rains in the Gulf and south Atlantic states, and by high local winds and gales from north to east on the Gulf coasts on the 19th and 20th. At the last report on the night of the 20th it was approximately central about one hundred miles to the east, and slightly to the north, of the mouth of the Rio Grande. The pressure at this time was above the normal over the entire country, except on the southern shore of Lake Superior, portions of northern California, Nevada, and Oregon,

where the variations from the mean were very slight, and in a narrow border along the coast of the west Gulf states and Rio Grande Valley, where the maximum depression below the normal, .18, then existed at Corpus Christi and Brownsville, Tex. Centres of high areas were in the north of the middle Atlantic states and northern Montana, averaging about .3 above the normal. Gradients were beginning to be close on the coasts of Texas. By the morning of the 21st the cyclone had apparently moved westward and slightly to the south and was approximately about fifty miles east of the mouth of the Rio Grande. The barometer at Brownsville, Tex., about twenty miles inland on the river, had fallen nearly .3, and read .38 below the reading reported from Rio Grande City, Tex., ninety miles westward. The gradients between were in consequence very marked, averaging about one-tenth of an inch in twenty-four miles. Heavy rain had fallen in the vicinity and still continued, and high winds and gales from north to east prevailed on the coasts of Texas, but had subsided on the Gulf coast eastward.

Within the next eight hours the barometer at Brownsville fell .52 as the cyclone approached the vicinity, the reading at the afternoon report being .84 below that at Rio Grande City. The gradients between were remarkably close, about .1 in eleven miles, while northward towards Corpus Christi, Tex., about one hundred and thirty-two miles distant, the average was about one-tenth of an inch in sixteen miles. Very heavy rain had fallen at Brownsville, 4.96 inches in the preceding eight hours, and still continued; the gale had also increased in fury, reaching a maximum of seventy-eight miles from the north at 1 p. m., and a current velocity of forty miles per hour was reported from the northwest. A high wind from the northeast still continued at Corpus Christi and a maximum velocity of forty-five miles was reported during the eight hours previous. At Key West, Fla., a maximum velocity of thirty miles had occurred during the previous eight hours, but the current velocity reported showed a subsidence below that considered as dangerous to navigation. Local rains generally light, except in the vicinity of Brownsville, where they were very excessive, had fallen both on the Gulf coasts and the eastern coast of Florida. The centre of the hurricane, about 4 p. m., was approximately a few miles to the southeast of Brownsville, moving slightly south of west. Soon afterwards the heavy rains changed to light and the barometer began to rise, but the gale still continued, with but slight abatement.

By the morning of the 22d the hurricane was approximately south, and a little to the east, of Rio Grande City, moving southwest into Mexico. Eight hours later it seemed to have advanced farther to the southward and westward beyond the limits of observation. During the 21st and on the morning of the 22d the gale materially damaged property, especially from Brownsville eastward on the Rio Grande to the coast, demolishing trees, fences, houses, etc., and at Point Isabel, Tex., tearing smaller craft from their moorings and carrying them into the Gulf. The greatest damage, however, was probably due to the heavy rains and the floods in the river and adjacent lowlands, which destroyed cattle and other live stock and materially injured cotton, sugar cane, and exposed products. While the damage that occurred was very extensive it would seem that first reports were materially exaggerated and, owing to the timely warnings given in advance and the precautions taken in consequence, the actual losses to property were very materially lessened. By the afternoon of the 22d the winds had subsided and the rains had generally ceased, though they still continued lightly at San Antonio and Rio Grande City, where they also ceased during the next eight hours. At Galveston, Tex., high winds prevailed during the 19th and 20th; a maximum velocity of forty miles per hour from the northeast was recorded during the forenoon of the latter date.

The Signal Service observer at Corpus Christi, Tex., reports as follows:

Brisk to high northerly winds prevailed on the 19th until 5 p. m., when the wind veered to northeast; it backed to north at 8.15 p. m., and attained its maximum velocity, thirty-three miles per hour from the north, at 9.17 p. m. High northerly winds prevailed during the 20th, attaining a maximum velocity of thirty-six miles. During the early morning of the 21st heavy rain fell, and light to heavy rain continued until 9 p. m. on that date. The wind veered to northeast and attained a velocity of forty miles per hour at 1.10 a. m., backing to north at 6.30 a. m., and then veering to northeast it reached its maximum velocity of forty-five miles per hour at 12.25 p. m.; brisk to high winds continued during the remainder of the day. The water in Corpus Christi Bay rose about 2½ feet from the 19th to the 21st.

Sergeant A. B. Crane, Signal Corps, Brownsville, Tex., reports, concerning this storm, substantially as follows:

For several days prior to the 21st the winds which were light to fresh in force were from north to northeast; the temperature was slightly below the mean; fair weather prevailed, with cumulo-stratus clouds predominating; the barometer was below the normal, and fluctuated but slightly, until the night of the 20th, when it fell rapidly. The telegraphic advices received from the office of the Chief Signal Officer (through the observer at Corpus Christi, Tex.), regarding the movements of the cyclone were placed before the public, and had therefore warned the inhabitants of, and prepared them for, the approaching dangerous storm.

A light drizzling rain set in at 2.20 p. m. on the 20th and continued until 11 p. m., when the rain increased to "heavy" and subsequently to "very heavy." At 7 a. m. of the 21st the barometer read 29.45, wind ne., twenty-five miles per hour, and heavy rain. The barometer continued to fall steadily until at 1.45 p. m., when a minimum of 28.93 was reached; then the pressure seemed to fluctuate slightly, but by 2.15 p. m. had risen to 28.96; by 4 p. m. the barometer had again fallen to 28.93, but shortly afterwards began to rise rapidly.

The following table shows the readings of the barometer, with direction and velocity of the wind, at Brownsville during the storm:

Date.	Time. (75th meridian.)	Barometer (reduced to sea-level).	Wind.		Date.	Time. (75th meridian.)	Barometer (reduced to sea-level).	Wind.	
			Direction.	Velocity, miles per hour.				Direction.	Velocity, miles per hour.
		Inches.					Inches.		
20	10.00 p. m..	29.92	nw.	15	21	3.15 p. m....	28.96	nw.	36
21	7.00 a. m....	29.45	ne.	25	21	3.30 p. m....	28.94	nw.	36
21	1.00 p. m....	29.00	n.	78	21	4.00 p. m ..	28.93	nw.	18
21	1.15 p. m....	28.97	n.	50	21	4.30 p. m....	28.94	nw.	12
21	1.30 p. m....	28.94	nw.	40	21	5.00 p. m....	28.96	nw.	11
21	1.45 p. m ...	28.93	nw.	53	21	5.30 p. m....	28.98	w.	9
21	2.00 p. m...	28.95	nw.	43	21	6.00 p. m....	29.03	w.	12
21	2.15 p. m ...	28.96	nw.	40	21	10.00 p. m..	29.37	se.	24
21	2.30 p. m ...	28.95	nw.	37	22	2.00 a. m....	.....	s. and se.	60
21	2.45 p. m....	28.95	nw.	45	22	7.00 a. m....	29.74	se.	17
21	3.00 p. m....	28.95	nw.	38					

At Point Isabel, Tex. (situated about twenty-three miles northeast of Brownsville), the wind on the morning of the 21st blew from the northwest and north, shifting to the northeast and east and finally to the south, while at Brownsville, same time, the wind came from the northeast, backing to the northwest and west and finally to south. The maximum velocity attained at Brownsville was seventy-eight miles per hour at 1 p. m. (75th meridian time) of the 21st; afterwards the wind decreased in force until at 4.10 p. m., when a lull occurred, and to all appearances the storm seemed to be over; between 4.10 to 5 p. m. the wind became variable, swinging in all directions, and by 6.45 p. m. it had backed to the southwest and began blowing at a high rate, increasing in force to sixty miles per hour. The lull at Point Isabel began at 11 a. m., and lasted until about sunset.

At Brownsville, the wind of sixty miles, south and southeast, at 2 a. m. of the 22d caused more damage to the city and vicinity than did the higher velocity of seventy-eight miles, north, at 1 p. m. on the 21st. This the observer considers due to the fact that the inhabitants protect their homes and property against the "northers" and high northerly winds more so than against the south winds. Many fences, trees, and small houses, principally of Mexican construction, consisting of but the lighter building materials, were blown down, and the streets presented a picture of devastation.

The greatest damage reported occurred from the effects of the heavy rains and the flooding of the Rio Grande River. The river banks were overflowed and the flats and bottoms filled with water, although the streets were not flooded. The roads leading into Brownsville became impassable and up to this writing (October 6) their condition remains unchanged. At Point Isabel the [illegible] "Romp," the schooner "Mignonette," and the yacht "Maud B" went out of sight of and have not been heard from since. The "Mignonette" was a Government light-house boat, and had a crew of fourteen persons. At and about Brownsville no great damage was sustained either to property real or personal, and this fact is largely due to the warnings issued by the Signal Service, as the inhabitants were busily engaged in nailing up their windows and fences, bracing their houses, and taking other precautions against damage, when the storm was reported as coming toward southwest Texas. The newspaper correspondents erroneously reported one million dollars damage. The reports were written on the day of the storm, when, to all appearances, that estimate seemed justifiable; but after the storm had passed and the actual damages estimated, it is found that $10,000 will fully cover all losses to property. The United States military telegraph line was blown down in several

places and could have been easily repaired, but for the flooded condition of the country along the river by which the line runs.

The following table shows the rainfall, in inches, at Brownsville during the storm:

Date.	Time, 75th meridian.			Total.
	7 a. m.	3 p. m.	10 p. m.	
Sept. 20	0.00	0.00	0.02	0.02
21	1.60	4.96	1.94	8.50
22	1.88	0.38	0.00	2.26
				10.78

Reports received from Santa Maria, Tex., twenty miles northwest of Brownsville, indicate that the winds and rains experienced there were about the same as at Brownsville.

Mr. Egan, of Point Isabel, furnishes, through the observer at Brownsville, the following record of observations taken during the storm:

Observations at Point Isabel.

Date.	Time. (75th meridian.)	Barometer.	Direction of wind.	Remarks.
		Inches.		
Sept. 20	7.10 p. m....	29.73	nw.	Water high; drizzling rain.
21	7.30 a. m....	29.13	nw.	Hurricane since 4 a. m.
21	9.50 a. m....	28.76	n.	Do.
21	10.45 a.m....	28.74	ne.	Wind weakening.
21	11.00 a. m....	28.74	ne.	Wind very light.
21	11.45 a. m..	28.77	ne. by e.	Do.
21	12.30 p. m..	28.79	e. by s.	
21	12.40 p. m..	28.82	se.	Wind fresh; water falling fast.
21	1.45 p. m....	28.98	se.	Wind fresh.
21	2.30 p. m....	28.98	se.	Do.
21	3.10 p. m....	29.00	se.	Do.
21	4.30 p. m....	29.12	se.	Do.
21	6.40 p. m....	29.27	se.	Do.
21	8.10 p. m....	29.40	se.	Do.
21	8.55 p. m....	29.44	se.	Do.
21	11.40 p. m..	29.56	se.	Wind fresh; stronger.
22	7.30 a. m....	29.76	s.	Wind moderate; very heavy rain.
22	8.30 a. m....	29.83	s.	Wind moderate.
22	11.00 a. m..	29.86	s.	Do.

NOTE.—Glass stands in ordinarily good weather with easterly winds at 30.00 inches; elevation above sea, eleven feet.

The Chicago "Times" of the 24th contained the following:

MATAMORAS, MEXICO, *September* 23.—The great storm of Wednesday (21st) night and yesterday morning did extensive damage in Matamoras and for twenty miles south of here and forty miles west along the Rio Grande. Telegraph wires were prostrated, preventing early accounts of the storm. The wind reached the velocity of a hurricane, blowing eighty-five miles an hour, as registered at the headquarters of the Mexican troops located here. The hurricane drove the sea into the mouth of the Rio Grande, causing it to overflow its bank on the Mexican side for a distance of nearly a hundred miles from its mouth.

The principal streets in Matamoras were submerged to a depth of three feet. Many old houses in the city collapsed and were carried away by the wind and flood. Notwithstanding the great destruction to property, no lives are yet known to have been lost, but many people were wounded by flying débris and falling houses. Narrow escapes from death are recounted by hundreds. The hurricane was so powerful that not a single metal roof remains in the city. They were all curled up like so much paper and hurled to the ground. All fences in the city and for miles surrounding have disappeared. In many instances not a single board is left on the ground—nothing but the naked posts. It is thought that every frame house in the city was moved more or less from its foundation or otherwise damaged.

During, and immediately following, the progress of the storm rescuing parties were organized and sent out to relieve people in the lagoon districts of the city, where the flood was dangerously deep. The rain poured down in blinding sheets for several hours, adding terror to the hurricane and the raging river. The government troops were all called out to assist the police in the work of rescue. The public school and government buildings are now crowded with refugees, whose homes have disappeared. Not less than a hundred small houses (jacals) were destroyed, while all of the larger buildings and residences are damaged. The Matamoras and Rio Grande Railroad sustained serious loss. Its track is swept away for many miles along the river, and its depots demolished. The federal and state authorities are feeding the homeless victims of the storm. Matamoras suffered much greater damage than Brownsville.

The following telegraphic warnings concerning this storm were issued from the office of the Chief Signal Officer:

WASHINGTON CITY, *September* 16, 1887—12.40 p. m.

Secretary Maritime Exchange, New York City; observers at New Orleans, Mobile, Cedar Keys, Key West, Galveston, Pensacola, Corpus Christi:

The following has been received from Havana, Cuba, this morning: "Storm-centre southwest of station; cyclonic disturbance; additional information will be given later." CRAIG.

WASHINGTON CITY, *September* 16, 1887—6 p. m.

Secretary Maritime Exchange, New York City; observers at New Orleans, Mobile, Cedar Keys, Key West, Galveston, Pensacola, Corpus Christi:

Afternoon special from Havana, Cuba, reports the cyclonic disturbance as central southwest of that station, and probably moving westward with slightly increasing energy. CRAIG.

WASHINGTON CITY, *September* 18, 1887—5.40 p. m.

Secretary Maritime Exchange, New York City, and to Collector of Customs, Appalachicola, Fla.:

The cyclone reported Saturday (17th) as moving into the Gulf is apparently approaching the central and western Gulf coasts. Northeasterly gales are indicated, except on southern Texas coast, with rain. CRAIG.

WASHINGTON CITY, *September* 20, 1887—10 a. m.

Secretary Maritime Exchange, New York City:

The cyclone is central off the western Gulf coast. Easterly gales have occurred from Galveston to Pensacola. CRAIG.

WASHINGTON CITY, *September* 21, 1887—10.20 a. m.

Secretary Maritime Exchange, New York City: observers, Key West, Cedar Keys, Pensacola, Mobile, New Orleans, Galveston, and Corpus Christi.

Cyclone has moved northwestward to Texas coast. CRAIG.

The Acting Chief Signal Officer desires to express his indebtedness to the Rev. Benito Viñes, S. J., of the Belen College Meteorological Observatory, Havana, Cuba, for the timely information furnished this office of the passage of the above-described storm over the region of the West Indies.

VIII.—Another low area appeared in the western valley of the Saskatchewan, near the mountains on the borders of British Columbia, on the night of the 22d. A high area was then advancing eastward from the northern slope. Moving east, with but little energy, it crossed the lakes north of Manitoba on the night of the 23d and on the 24th passed beyond the limits of observation, apparently continuing its progress in the same direction. Its passage so far north was probably due to the high pressure then moving in a similar direction farther south.

IX.—The path of this slight depression was entirely beyond the limits of the United States and can only be approximately located during the earlier translation. The low area was first observed in the western Saskatchewan valley, north of Montana, on the afternoon of the 24th. Under the influence of the higher pressure to the southeast it moved eastward south of the Saskatchewan, apparently with but feeble energy, and reached the lakes north of Manitoba on the night of the 25th, passing thence beyond the limits of observation. Light local rains attended its passage in the valley and extended southward into Dakota and Minnesota during its progress eastward.

X.—Midnight reports of the 24th indicated the presence of a marked depression off the southern coast of Nova Scotia, which was probably the same disturbance that had been observed off the coasts of the Carolinas on the afternoon of the 23d and had subsequently been forced northeastward over the Gulf Stream by the high pressure advancing from the west. The gradients were marked over the Maritime Privinces and New England. Heavy local rains had fallen over Nova Scotia and Cape Breton, and still continued. Light local rains were reported northward to the Saint Lawrence and in northern New England, and gales had occurred on the southern coasts of the latter. A wind of thirty miles from the northwest was reported at Hatteras, and a maximum velocity of thirty-five miles during the previous eight hours. It moved rapidly northward over southwestern Nova Scotia and eastern New Brunswick, with moderate energy, into the Gulf of Saint Lawrence, where it was central off Chaleur Bay on the afternoon of the 25th. Local rains had fallen from Quebec eastward to the Gulf, in the Maritime Provinces, and northern New England, and still prevailed near the centre of disturbance. Snow also had fallen at Mount Washington, N. H., and in western Maine, and still continued at the former. High winds had occurred at a few coast stations. During the next eight hours the centre of its path apparently trended to the northwest. Subsequently changing direction to the northeast it moved off, north of the Gulf, towards southern Labrador, and was followed by brisk and high winds near the Magdalen Islands.

XI.—On the afternoon of the 25th a belt of pressure below the normal extended from Mexico to the British Possessions; bounded on the west by a line passing diagonally from Yuma through Arizona and Colorado to Cheyenne, and thence passing northwesterly through the eastern portions of Wyoming and Montana it stretched eastward over portions of the extreme northwest, the Missouri Valley, the northwestern border of the west Gulf states, and the Rio Grande Valley. The minimum pressure was over the middle and southern slopes. High areas existed over the Lake region, and in Oregon and Washington Territory. Light local rains had fallen in the region of minimum pressure and adjacent borders. The rapid advance of the high area from the Northwest and the high pressure eastward prevented for a time the development of sufficient energy to cause translation, contracted the area, causing it to assume the general outline of an inverted V, and forced the nucleus of minimum pressure southeastward towards the Gulf, south of San Antonio, Tex., and west of Corpus Christi, Tex., where it was located on the afternoon of the 26th. Frequent light local rains had fallen meanwhile throughout the Mississippi Valley, and still continued. As the high pressure on the east progressed towards the coast the depression began to move towards the northeast. The temperature at this time east of the Rocky Mountains, except in portions of Montana, Dakota, and Minnesota where the abnormal variations were slight, was below the mean, in some instances 18°. Copious local rains consequently continued in the region of the Mississippi from the Gulf northward to the British Possessions, and gradually extended eastward. The centre of disturbance continued to move northeastward, crossed the Mississippi and passed into western Alabama on the afternoon of the 27th, thence trending first to the northward and afterwards to the northwest it passed through western Tennessee, and recrossing the river south of Cairo, Ill., passed into Missouri on the morning of the 28th. Curving crescent-like through the state, the maximum convexity reaching to about the centre, it again crossed the river near Keokuk, Iowa, on the night of the 29th, and at the morning report of the 30th was central in northwestern Illinois, to the southwest of Chicago. Trending thence more to the northward it crossed the lake diagonally to the coast of Michigan, north of Grand Haven, and at the last report on the night of the 30th was central near Grand Traverse Bay, Mich., apparently moving in a direction a few degrees east of north. No marked changes in energy occurred during its translation, but it was attended by abundant rains, the rain belt gradually extending to the east and northeast as the disturbance moved northward, so as to embrace the entire country to the coast south of the Saint Lawrence. By the night of the 31st the rains had ceased both in the west and south, and were confined mainly to localities in the Lake region, northern portions of the middle Atlantic states, and New England. Winds at the close of the month had begun to freshen on the Lakes, and in a few instances had reached velocities considered dangerous to navigation, but had not probably yet reached their maxima.

Another low area was at the midnight report on the 30th apparently central in the western Saskatchewan Valley, north of Montana.

NORTH ATLANTIC STORMS DURING SEPTEMBER, 1887.

[*Pressure in inches and millimetres; wind-force by Beaufort scale.*]

The paths of the depressions that have appeared over the north Atlantic Ocean during the month are determined, approximately, from international simultaneous observations furnished by captains of ocean steamships and sailing vessels; abstracts of ships' logs and other data collected by the Signal Service agencies at the ports of New York, Boston, and Philadelphia; reports received through the co-operation of the "New York Herald Weather Service;" and from other miscellaneous data received at this office up to October 21, 1887.

Nine depressions are traced, of which five were of tropical or sub-tropical origin; three advanced eastward from the American continent north of the forty-fifth parallel, and one first appeared over the British Isles.

Of the five depressions traced south of the thirtieth parallel, two are given a probable northerly track to the Banks of Newfoundland, from whence one advanced east-northeast to the British Isles; one moved westward over the Caribbean Sea and entered the Gulf of Mexico; one is first charted north of the western extremity of Cuba, whence it moved northeast to the European coast, and one advanced from the vicinity of the Bahama Islands to Nova Scotia and thence recurved eastward. Of the three depressions which advanced over the ocean north of the forty-fifth parallel, one united with a cyclonic area which had moved northward from the tropics; one disappeared northeast of Newfoundland, and one pursued an irregular course from the coast of Labrador and apparently dissipated over mid-ocean south of the fiftieth parallel. The depression which appeared over the British Isles on the 1st advanced northeast beyond the region of marine observations by the 2d.

During the first decade of the month the weather conditions were generally unsettled over the entire ocean, attending the passage of depressions numbers 1, 2, and 3. During the second decade fair weather prevailed over the eastern portion of the ocean, while in mid-ocean and over, and to the southward of, the Banks of Newfoundland stormy weather accompanied the passage of depressions numbers 4, 6, and 7. In the Gulf of Mexico the weather conditions were governed from the 18th to the 21st, inclusive, by depression number 5. During the third decade the weather continued fine east of the fortieth meridian, while over the western portion of the ocean disturbances of small strength were occasioned by depressions numbers 8 and 9.

Compared with the storms traced for corresponding months of previous years, the depressions which appeared during September, 1887, were deficient in number and energy; the paths were confined to more southern latitudes, and while in the region west of the fiftieth meridian the aggregate number of cyclonic depressions of tropical origin somewhat exceeded the average for the month, there was a corresponding decrease in the number which passed eastward over Newfoundland, and an almost entire absence of storms of pronounced strength in high latitudes east of the fortieth meridian.

The following are brief descriptions of the depressions traced:

1.—This storm was central on the 1st between Cuba and southern Florida, whence it circled slowly northeastward to the thirtieth meridian by the 5th, after which it advanced rapidly northeastward and disappeared over the northern portion of the British Isles after the 8th. This depression displayed small energy during its passage off the Florida coast; with its advance over the ocean, however, it occasioned heavy rains and fresh to strong gales.

The following special reports refer to this depression: Capt. D. W. Storer, of the brig "Abbie Clifford," reports: "August 31st, 2.30 p. m., in N. 25° 10′, W. 80° 00′, a heavy squall from e., with heavy rain and very black weather; the wind died out as the rain ceased. At night the wind increased, and at midnight was blowing from ene., force 8. From the 1st to the 5th of September, between the above position and N. 28° 30′, W. 80° 00′, experienced unsettled weather, with frequent se. to ne. gales of force 7 to 8, and rain in squalls. Capt. C. W. Möller, of the s. s. "Geiser," reports a gale on the 7th and 8th, between N. 54° 44′, W. 26° 32′, at noon of the 7th, and N. 56° 39′, W. 19° 24′, at noon of the 8th; wind shifted from w. by s. to ssw., and veered to nw. by n.; lowest barometer, 29.25 (743.0), at midnight of the 7th, in N. 55° 46′, W. 22° 50′, when wind was ssw., force 9.

2.—This depression was central on the 1st in about N. 29°, W. 55°, whence it had apparently advanced from the tropics; by the 2d the storm-centre had moved northeast to the thirty-third parallel, in about W. 58°, from which position it circled northward to the Banks of Newfoundland by the 3d; by the 4th the depression had passed rapidly northeast to N. 52°, W. 30°, and by the 5th to N. 56°, W. 23°; during the next twenty-four hours the depression pursued an east-southeast course to the Irish coast, and by the 7th had advanced eastward beyond the region of observation. This depression was attended by disturbances of marked violence throughout its course, as is indicated by the following special reports:

Captain Shaw, of the ship "Inflexible," reports: "1st, in N. 33° 34′, W. 56° 00′, at noon, wind freshening and barometer falling; wind backed to ese. and then to e., blowing stiff breeze; heavy se. seas; 10 p. m., barometer falling rapidly; sea ese., with long roll; the sun rose and set like a ball of fire. 2d, 1 a. m., barometer falling, wind increased to a gale, and backing to ne.; 4 a. m., wind backing, barometer falling; rain and terrific squalls; the sea one mass of foam; 10 a. m., moderating, wind nw.; barometer rising; position at noon, N. 32° 21′, W. 60° 10′." Capt. O. Olsen, of the bark "Hermon," reports: "2d, in N. 43° 10′, W. 51° 29′, at noon, s. and sse. wind and rapidly falling barometer. 3d, in N. 42° 2′, W. 53° 48′, at noon, wind drawing to ne., with heavy rain; 4 a. m., wind n., force 10; very heavy ssw. sea; barometer commenced to rise and wind moderated and drew to wnw."

Capt. C. W. Möller, of the s. s. "Geiser," reports: "1st, 7 a. m., in N. 43° 26′, W. 59° 22′, entered a fog bank, which continued without any clearings until the 3d, when it was dispersed by a cyclone which passed to the southward of the 'Geiser.' 3d, 8 a. m. (in N. 45° 50′, W. 49° 45′), barometer 29.53 (750.0); wind s. by e., 5; dense fog. 10 a. m., barometer 29.39 (746.5); wind sse, 6; heavy rain. Noon (in N. 46° 20′, W. 48° 58′), barometer 29.29 (744.0); wind se., 6; heavy rain. 1 p. m., wind ese, 7; heavy rain. 1.30 p. m, wind e. by n., 7; heavy rain. 2 p. m., wind ne. by e., 7; heavy rain. 3 p. m., wind ne., 9; heavy rain. 4 p. m. (in N. 46° 46′, W. 48° 14′), barometer 28.86 (733.0); wind ne. by n., 9; heavy rain. 4.30 p. m., barometer 28.86 (733.5); wind nne., 10; rain moderating. 5 p. m., barometer 28.92 (734.5); wind nne., 10. 6 p. m., barometer 28.96 (735.5); wind n. by e., hurricane. 7 p. m., barometer 29.06 (730.0); wind n. by w., 10. After this the clouds broke and barometer rose rapidly and the wind settled into an ordinary gale from nw. by n. that continued two days, with a heavy sea."

Capt. J. J. Brarens, of the s. s. "DeRuyter," reports a hurricane on the 3d; wind backed from se. to e., ne., and nw.; lowest barometer, 29.10 (739.1), at 7.40 a. m., in N. 41° 16′, W. 54° 54′. Capt. E. Smit, of the s. s. "Pieter de Coninck," reports a storm on the 3d; wind veered from sse. to sw.; lowest barometer, 28.48 (723.4), at 3 p. m., in N. 44° 48′, W. 48° 08′. Capt. G. W. Koch, of the s. s. "Taormina," reports a hurricane on the 3d; wind veered from se. to nw.; lowest barometer, 28.44 (722.4), at 5.15 p. m., in N. 43° 48′, W. 48° 17′. The s. s. "City of Rome" encountered a whole w. to nw. gale on the 4th; lowest barometer, 29.08 (738.6), at noon, in N. 50° 37′, W. 35° 11′. On the 5th and 6th the depression was accompanied by heavy gales east of the thirty-fifth meridian.

3.—This depression apparently advanced from the ocean over the British Isles, where it was central on the 1st, with hard gales, and pressure ranging below 29.00 (736.6) off the southwest coast of Ireland; by the 2d the centre of depression had moved to the north of Scotland, without an appreciable decrease in energy.

The following special report refers to this storm: Mr. W. Grierson, observer on the s. s. "City of Rome," Capt. Hugh Young, commanding, reports: 1st, 7.30 p. m., barometer 28.82 (732.0), whole gale; 11.30 p. m., in N. 51° 15′, W. 11° 35′, barometer 29.15 (740.4), gale at its height, with high, dangerous sea and very heavy squalls; 2d, a. m., gale moderating. Wind during gale from w., nw., and n., blowing hardest at nw., and backing to westward as gale moderated.

4.—This depression passed eastward over northern Newfoundland and was central at noon (Greenwich time) of the 11th in about N. 53°, W. 52°, with central pressure about 29.70 (754.4); by the 12th the storm-centre had moved east-northeast to about N. 56°, W. 42°, with an apparent decrease in pressure; by the 13th the depression had moved eastward to the thirtieth meridian. During the 14th and 15th the storm circled southward and then northward, and by the 16th had moved southeast to the forty-eighth parallel, after which it disappeared in the direction of the Spanish coast. The causes which influenced the abnormal direction of movement of this depression during the last three days of its course cannot be determined, owing to an absence of reports from the region to the eastward and northeastward of its position on those dates.

5.—This depression is given a probable track from east of the Windward Islands to Yucatan, the period embraced by its passage over the Caribbean Sea including the 11th and the 17th. During the latter date the storm moved northwest over Yucatan into the Gulf of Mexico, and advanced to the mouth of the Rio Grande River by the 21st. Owing to the limited number of reports received from the region traversed by this depression, its charted track over the Caribbean Sea is only approximately correct, and accurate data relative to its intensity cannot be given. With its advance over the Gulf of Mexico, however, it was accompanied by gales of hurricane force.

6.—This depression advanced southeastward over Newfoundland during the 16th and united with depression number 7 over the southern portion of the Banks of Newfoundland on the 17th. The storm did not possess marked individual energy and was drawn southward by the more powerful depression which advanced from the southward.

7.—This depression was of tropical origin, and moved northward in the vicinity of the fifty-fifth meridian during the 15th and 16th, attended by storms of hurricane force. During the 17th the centre of depression passed east of north over the Banks of Newfoundland, and during the 18th moved north of the fiftieth parallel and beyond the region of observation. The following special reports indicate the character of the disturbances occasioned by this cyclone during its passage over the Grand Banks:

Capt. N. Maass, of the s. s. "Marsala," reports a strong gale on the 16th and 17th; wind veered from se. to nw.; lowest barometer, 29.02 (737.1), at 9 p. m. of the 17th, in N. 45° 26′, W. 50° 54′. The gale was accompanied by heavy rain, and fog prevailed until the passage of the storm-centre. Mr. J. Higgins, observer at Saint John's, N. F., reports: "strong ne. gale, with heavy rain, commenced on afternoon of the 17th; at 11 p. m. barometer fell to 29.31 (744.5); gale increased and continued till the morning of the 18th, when it veered to nw. and moderated." This gale caused considerable damage to shipping along the Newfoundland coast, and the Banks fishing fleet suffered severely.

8.—This depression passed eastward over the northern portion of Newfoundland, and was central on the 23d in about N. 50°, W. 53°, after which it moved northeast beyond the region of observation. During the 22d fresh gales were reported south of Nova Scotia, and on the 23d fresh to strong gales were encountered over the Banks of Newfoundland.

9.—This depression first appeared northeast of the Bahamas on the 24th, with central pressure about 29.70 (754.4), whence it advanced rapidly to Nova Scotia by the 25th, where pressure ranging below 29.70 (754.4) was shown; by the 26th the centre of depression had circled southeast over the ocean, and during the next three days it moved slowly northeast, with a moderate display of energy.

OCEAN ICE.

On chart I are also shown the positions in which icebergs and field ice were reported during September, 1887. These positions are determined from reports furnished by ship-

masters, and from data collected by the Signal Service agencies.

The easternmost and southernmost ice reported was a large berg, passed on the 1st, in N. 45° 37′, W. 40° 50′, by the s. s. "Jesmond." On the 8th a quantity of drift-ice was encountered over the northeast part of the Banks of Newfoundland, and on the 18th and 28th icebergs were observed in the Strait of Belle Isle. As compared with August, 1887, there has been a very great diminution in the quantity of ice reported, as, excepting on one date, no icebergs or field ice were observed over any portion of the Grand Banks for September, while during the preceding month they were frequently encountered along the eastern and southern edges of the Newfoundland Banks. In the vicinity of Belle Isle the aggregate quantity of ice reported for September exceeded that of the preceding month.

As compared with September, 1886, there was a slight decrease, and while the reports for that month show that ice was more frequently encountered near and to the eastward of Belle Isle, the eastern and southern positions of isolated bergs or field ice were about eight degrees farther west and one degree farther north than in the corresponding month of 1887.

The following table shows the southern and eastern limits of the region within which ice was reported for September during the last five years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Lon. W.	Month.	Lat. N.	Lon. W.
	° ′	° ′		° ′	° ′
September, 1883	48 25	47 10	September, 1883	49 01	44 33
September, 1884	46 00	53 21	September, 1884	47 39	49 14
September, 1885	45 40	48 22	September, 1885	48 40	46 27
September, 1886	46 40	53 00	September, 1886	48 00	48 40
September, 1887	45 37	40 50	September, 1887	45 37	40 50

Icebergs and field ice were reported during the month as follows: 1st, s. s. "Jesmond," in N. 45° 37′, W. 40° 50′, one large berg; 8th, s. s. "Polaria," in N. 46° 03′, W. 49° 44′, drift ice; 18th, s. s. "Lake Nepigon," in Strait of Belle Isle, three large bergs; 28th, s. s. "Iceland," from Charles Island, Labrador, to and in the Strait of Belle Isle, fifty or sixty bergs of all sizes.

FOG.

The following are the limits of fog-areas on the north Atlantic Ocean during September, 1887, as reported by shipmasters:

Limits of fog areas—Continued.

Date.	Vessel	Entered.			Cleared.		
		Lat. N.	Lon. W.	Time.	Lat. N.	Lon. W.	Time.
		° ′	° ′		° ′	° ′	
1	S. S. Waesland	41 58	60 58		41 46	61 42	
1	Fog at St. John's, N. F.						
1	S. S. Britannic	43 00	59 06		42 22	61 47	8 hours.
1–2	S. S. Switzerland	45 30	43 40	8 p. m	43 20	51 19	Midnight.
1–2	S. S. Erin	44 30	51 00		43 30	56 40	
1–2	S. S. Servia	46 25	45 03		43 50	53 10	
1–2	S. S. Oxford	44 18	53 38		43 12	58 35	
1–2	S. S. Island	42 30	60 11		41 51	62 45	
1–3	S. S. Leerdam	45 53	47 11	4.30 p. m.	43 51	54 27	2.38 p. m.
1–3	S. S. Taormina	42 59	55 58		43 48	48 17	
1–5	Sp. B. D. Metcalf	45 24	45 03		44 10	49 45	
2	S. S. Ludgate Hill	47 44	47 55		47 08	50 48	
2	S. S. Australia	42 26	56 50		42 28	56 20	
2–3	S. S. Werra	46 48	43 24		44 43	51 12	
6	S. S. Baltimore	44 12	52 10		48 15	41 00	
6	Fog at St. John's, N. F.						
6	S. S. Canada	45 57	47 16		45 04	51 05	
6–7	S. S. Celtic	47 37	45 21	5-13 p. m.	45 46	50 43	11 a. m.
7	S. S. Australia	43 01	47 50		42 50	50 30	
7–8	S. S. Polaria	45 30	52 20		46 20	48 15	
7–8	S. S. Circassia	51 12	39 43		47 50	48 55	
7–9	S. S. W. A. Scholten	46 14	45 36		43 03	57 37	
8–9	S. S. Lord Gough	48 40	41 46		46 55	48 20	
9	S. S. Polaria	47 45	41 40		48 58	27 40	
9	S. S. Cephalonia	50 29	26 32		47 19	42 46	
9	S. S. Scandinavian	49 54	42 42		49 26	44 36	
9	S. S. Main	47 47	42 29	4.30 a. m.	47 26	44 13	9 30 a. m.
9	S. S. Eider	47 54	42 07		47 32	43 53	
9–11	S. S. Britannic	44 00	52 04		46 48	43 32	
10	S. S. Amalfi	48 41	44 28		47 16	50 26	
10	S. S. Arizona	48 43	39 42		49 08	37 37	
10	S. S. Eider	46 00	48 45		44 33	53 48	
10–11	S. S. Lord Gough	46 53	50 30		43 50	56 50	
10–11	S. S. Scandinavian	47 34	50 03		46 01	54 32	
11	S. S. Main	44 16	54 31	1.30 a. m.	44 00	55 23	6.30 a. m., at intervals
14	S. S. Scandinavian	42 26	68 32		42 20	69 52	
14	S. S. Alamo	39 25	74 05		38 00	74 30	
14–15	Sp. B. D. Metcalf	40 30	69 25		40 02	71 15	
15	S. S. Cephalonia	42 37	64 46		42 30	65 42	
15	S. S. Trave	41 30	66 35		41 21	67 27	
15	S. S. Aurania	45 21	49 25		44 28	53 11	
15–16	S. S. Buffalo	44 20	49 16		43 45	55 05	
15–16	S. S. LaChampagne	44 54	53 05		43 23	59 07	
16	S. S. Fulda	46 50	46 25		44 30	54 30	
16	Fog at St. John's, N. F.						
16–17	S. S. Dorian	43 05	51 25	10.30 p. m.	43 15	50 38	2.30 a. m.
16–17	S. S. Saint Ronans	46 09	48 19		44 21	54 17	
16–17	S. S. State of Indiana	47 20	44 40		43 40	51 20	
16–17	S. S. Westernland	47 26	44 36		45 30	50 10	
16–17	S. S. Rugia	46 08	46 15	5 a. m.	44 36	51 27	7 a. m.
17	S. S. Dorian	43 34	49 20	8.30 a. m.	43 55	48 04	4 p. m.
17	S. S. Ems	44 28	52 16		45 48	47 33	
17	S. S. India	42 05	48 22	9.40 a. m.	42 09	50 36	9 p. m.
22–25	S. S. Hekla	51 45	38 06		45 00	52 00	
23	S. S. Vaderland	46 54	48 06		46 40	48 48	
23	Fog at St. John's, N. F.						
23–24	S. S. Polynesia	47 15	46 20		46 14	48 26	
23–25	S. S. Rotterdam	48 23	43 21		44 41	54 25	
24	S. S. Vaderland	46 08	50 23		45 44	51 39	At intervals.
24	Fog at St. John's, N. F.						
24	S. S. Trave	44 57	52 27		45 55	49 03	
25	S. S. Polynesia	44 50	53 20		44 09	55 36	
25	do	46 23	47 32		47 57	41 14	
25	Fog at St. John's, N. F.						
25–27	S. S. Ohio	48 40	40 20		45 18	53 20	
25–26	S. S. Main	42 52	52 19		43 50	49 14	
25–26	S. S. Cephalonia	43 40	53 10		44 20	55 56	
26	Fog at St. John's, N. F.						
26	S. S. Hekla	44 40	53 30		44 10	55 00	
26	S. S. LaChampagne	44 29	55 22		44 46	53 54	
27	do	45 22	50 53		45 38	49 31	
28	S. S. Devonia	49 50	44 22		49 41	44 47	
29	S. S. LaBretagne	48 15	46 00		48 05	47 00	

On chart i the limits of fog-belts to the westward of the fortieth meridian are shown by dotted shading.

As compared with the chart for August, 1887, the southern limit of fog reported in the vicinity of Newfoundland during September is shown to be about one-fourth degree farther south, while the eastern limit is appreciably extended to the northeastward. In the vicinity of Sable Island Bank fog was reported about one degree farther south than in August, while in the immediate vicinity of the coast of the United States several fog-belts of limited area appear, two of which occupy more southern positions than were given to fog-banks by reports rendered for August.

The development of fog in the vicinity of Newfoundland was confined to three periods, viz., from the 1st to the 11th, from the 15th to the 17th, and from the 22d to the 29th. During the 1st and 2d falling barometer and south to east winds prevailed in this region. On the 3d the advance of a cyclonic area over the Banks, and the consequent shift of wind to the northwest quadrant following its passage, occasioned a temporary disappearance of fog. During the 4th and 5th, however, the wind again shifted to the eastern quadrants whence it continued, attended by dense fog, until the passage of a depression which moved northeast off the southern edge of the Newfoundland Banks during the 6th. On the 6th and 7th there was a short intermission of fog accompanying the winds in the western quadrants of depression number 1. From the 8th to the 11th, inclusive, no well-defined storm-area advanced eastward over the Banks, and the south to east winds which prevailed, accompanied by fog, are attributed to the relatively low barometric pressure which prevailed to the northward of that region, which became more marked with the advance, on the 11th, of depression number 4 over northern Newfoundland.

From the 12th to the 14th, inclusive, the weather continued settled over the Grand Banks and no fog was reported. On the 15th a cyclonic area was central over the Gulf of Saint Lawrence, and on this and the two following dates, during which depression number 7 advanced from the southward and crossed the Banks, dense fog prevailed. From the 18th to the

21st, inclusive, the meteorological conditions continued normal, following the passage of depression number 7, and no fog was reported. During the 22d and 23d fog was occasioned by the passage of a cyclonic area over the Gulf of Saint Lawrence and northern Newfoundland, and from the 24th to the 29th, inclusive, fog attended the approach and passage of depression number 9.

In the vicinity of Sable Island Bank fog prevailed on the 1st, 2d, and 15th. On the 1st and 2d marked ranges in temperature, attending the intermingling of warm southerly and cold northerly winds, occasioned rain and fog in that locality, and on the 15th the presence of cyclonic areas, one over the Gulf of Saint Lawrence and the other over the ocean to the southward, contributed to cause abnormal meteorological conditions. Fog was reported off the coast of the United States between the thirty-eighth and forty-third parallels on the 14th and 15th, and was apparently occasioned by the intermingling of warm southeast winds preceding, and cold northerly winds following, the passage of a cyclonic area over the Gulf of Saint Lawrence.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for September, 1887, is exhibited on chart ii by the dotted isothermal lines. In the tables of miscellaneous data are given the monthly mean temperatures, with the departures from the normal, for the various stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean for the district when the departure is below the normal, and subtracting when above. On chart iii the departures from the normal are illustrated by lines connecting stations of normal or equal abnormal values.

On the Pacific coast, in the Canadian Maritime Provinces, and along the central and western portions of the Gulf coast the mean temperature of September, 1887, is normal, or nearly so, the departures at a majority of stations not exceeding half of a degree. In the Rocky Mountain districts the month was decidedly warmer than the average, the departures from the normal temperature generally exceeding 2° over the southern districts, while over the northern they amount to, or exceed, 4°.

The most important feature of this month's temperature is the low monthly means in portions of the lower lake region, New England, and the middle Atlantic states, where the month averages from 4° to 6° colder than the normal, and it is worthy of note that this region coincides with that over which occurred the remarkably high mean temperatures of July, 1887.

The following are some of the most marked departures from the normal temperature at Signal Service stations, where the records cover eight or more years of observation:

Above normal.	°	Below normal.	°
Red Bluff, Cal	5.4	Mount Washington, N. H	5.9
Boisé City, Idaho	4.2	Albany, N. Y	5.7
Fort Buford, Dak	4.2	Saugeen, Ontario	5.7
Fort Apache, Ariz	3.8	Baltimore, Md	5.3
Santa Fé, N. Mex	3.8	Philadelphia, Pa	5.0
Salt Lake City, Utah	2.7	Detroit, Mich	5.0
Deadwood, Dak	2.7	Lynchburg, Va	4.3
Cheyenne, Wyo	2.6	Rochester, N. Y	4.3

RANGES OF TEMPERATURE.

The greatest daily range of temperature was 52° at Saint Vincent, Minn., on the 29th; the maximum daily ranges exceed 40° over the region extending from the extreme northwest southwestward to central California and in the districts to the northward; along the Gulf coast they vary from 15° to 20°.

The least daily ranges along the coasts of the Atlantic, Gulf, and Pacific are less than 5°, while over the interior of the country east of the Rocky Mountains, except at stations on the Great Lakes, they increase to 10°, and to 20° at stations in the central Rocky Mountain region.

The monthly, and the greatest and least daily, ranges of temperature, at Signal Service stations are given in the tables of miscellaneous meteorological data.

The monthly ranges exceed 60° at Lynchburg, Va., at some stations in the extreme northwest, and over portions of the middle plateau and middle Pacific coast region; along the Atlantic, Gulf, and Pacific coasts the monthly ranges are generally less than 40°, and at many stations are below 30°.

The following are some of the greatest and least monthly ranges at Signal Service stations:

Greatest.	°	Least.	°
Fort Klamath, Oregon	67.0	Key West, Fla	16.3
Saint Vincent, Minn	66.9	San Diego, Cal	21.4
Huron, Dak	63.4	Fort Grant, Ariz	25.5
Poplar River, Mont	62.2	Tatoosh Island, Wash	27.0
Las Animas, Colo	61.2	Brownsville, Tex	27.2
Moorhead, Minn	61.0	Titusville, Fla	27.7
Winnemucca, Nev	60.4	Fort Bowie, Ariz	27.8
Boisé City, Idaho	60.2	Cedar Keys, Fla	28.4
Lynchburg, Va	60.1	Corpus Christi, Tex	29.2

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperatures for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for September, 1887; (4) the departures of the current month from the normal; (5) and the extreme monthly means for September during the period of observations and the year of occurrence:

State and station.	County.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1887.	(4) Departure from normal.	(5) Extreme monthly mean temperature for September.			
						Highest.		Lowest.	
						Am't.	Year.	Am't.	Year.
		°	Years.	°	°	°		°	
Arkansas.									
Lead Hill	Boone	72.2	6	72.8	+0.6	76.4	1884	67.5	1883
California.									
Sacramento	Sacramento	66.7	21	65.2	−1.5				
Connecticut.									
Middletown	Middlesex	61.3	29	57.8	−3.5				
New Haven	New Haven	62.7	101	59.7	−3.0				
Thompson	Windham	61.4	30	56.2	−5.2				
Waterbury	New Haven	63.1	12	57.0	−6.1				
Dakota.									
Webster	Day	63.1	5	57.9	−5.2				
Illinois.									
Aurora	Kane	64.3	9	63.5	−0.8				
Golconda	Pope	71.1	10	72.3	+1.2				
Greenville	Bond	68.9	9	68.0	−0.9				
Mattoon	Coles	67.6	7	67.3	−0.3	71.0	1880-'84	64.0	1880
Peoria	Peoria	66.8	32	68.6	+1.8				
Riley	McHenry	60.4	26	59.3	−1.1				
Sycamore	De Kalb	62.5	7	60.8	−1.7				
Indiana.									
Connersville	Fayette	65.1	6	65.4	+0.3				
Lafayette	Tippecanoe	64.8	8	64.8	0.0				
Logansport	Cass	65.8	33	66.7	+0.9	73.8	1881	61.1	1868
Sunman	Ripley	66.8	5	66.6	−0.2				
Vevay	Switzerland	68.7	21	68.5	−0.2				
Worthington	Greene	67.2	6	68.7	+1.5				
Iowa.									
Cresco	Howard	59.4	10	58.0	−1.4				
Monticello	Jones	61.5	34	61.0	−0.5	73.0	1865	51.0	1856
Kansas.									
Independence	Montgomery	69.8	15	69.8	0.0				
Lawrence	Douglas	66.4	20	67.6	+1.2				
Wellington	Sunman	69.4	9	73.2	+3.8	74.5	1884	63.8	1883
Yates Centre	Woodson	68.1	7	64.4	−3.7				
Maine.									
Belfast	Waldo	57.6	28	55.5	−2.1				
Cornish	York	59.8	30	55.2	−4.6				
Gardiner	Kennebec	58.4	51	55.0	−3.4				
Orono	Penobscot	57.3	19	54.5	−2.8				
Maryland.									
Cumberland	Alleghany	64.2	16	62.0	−2.2				
Fallston	Harford	65.8	17	61.6	−4.2	74.6	1881	61.3	1871

Deviations from normal temperatures—Continued.

State and station.	County.	(1) Normal for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1887.	(4) Departure from normal.	(5) Extreme monthly mean temperature for September. Highest. Am't.	Highest. Year.	Lowest. Am't.	Lowest. Year.
Massachusetts.		°	Years.	°	°	°		°	
Amherst	Hampshire	60.2	50	57.8	−2.4				
Cambridge	Middlesex	61.8	65	59.8	−2.0				
Fitchburg	Worcester	59.7	31	56.2	−3.5				
New Bedford	Bristol	59.2	75	58.4	−0.8				
Somerset	Bristol	64.3	17	62.1	−2.2				
Springfield	Hampden	62.9	20	59.5	−3.4				
Taunton	Bristol	64.0	16	58.5	−5.5				
Nevada.									
Carson City	Ormsby	59.8	9	59.0	−0.8				
New Brunswick.									
Saint Johns	Saint Johns	55.2	27	53.3	−1.9				
New Hampshire.									
Concord	Merrimac	61.0	20	56.0	−5.0				
Hanover	Grafton	57.4	28	54.0	−3.4				
New Jersey.									
Dover	Morris	64.4	5	58.3	−6.1				
South Orange	Essex	63.6	18	61.2	−2.4				
New York.									
Factoryville	Tioga	59.4	6	55.9	−3.5				
Humphrey	Cattaraugus	60.9	3	57.9	−3.0				
Palermo	Oswego	60.4	34	54.6	−5.8	67.8	1881	54.1	1867
Ohio.									
North Lewisburg	Champaign	62.2	55	65.9	+3.7				
Wauseon	Fulton	62.4	17	61.2	−1.2	71.1	1881	57.2	1883
Pennsylvania.									
Corry	Erie	62.8	7	57.1	−5.7	71.8	1881	57.1	1887
Dyberry	Wayne	59.0	21	54.7	−4.3				
South Carolina.									
Statesburg	Sumter	73.4	7	71.3	−2.1				
Texas.									
New Ulm	Austin	77.7	16	78.3	+0.6	81.1	1879	75.6	1876
Vermont.									
Strafford	Orange	58.6	13	56.5	−2.1	64.3	1881	56.2	1876
Virginia.									
Bird's Nest	Northampton	70.6	19	69.1	−1.5				
Dale Enterprise	Rockingham	72.8	7	68.3	−4.5				
Variety Mills	Nelson	67.0	10	63.3	−3.7	75.2	1881	62.8	1879
Wytheville	Wythe	63.5	22	63.1	−0.4				
West Virginia.									
Helvetia	Randolph	61.5	10	60.3	−1.2				

FROST.

Frost occurred in the several states and territories during the month, as follows:

1st.—Mass., Mont., Nebr., Oregon, Pa.

2d.—Nev., Oregon.

3d.—Colo., Oregon.

4th.—Colo., Ohio.

5th.—Nev., Oregon.

6th.—Mich.

7th.—Dak., Mich., Minn.

8th.—Ill., Iowa, Mich., Minn., Nev., N. H., Ohio, Wis.

9th.—Mich., Minn., Oregon, Pa., Vt., Va.

10th.—Dak., Mich., Minn., Nev., N. H., Pa., Wis.

11th.—Me., N. Y., Vt.

12th.—Cal., Colo., Mich., Nev., Ohio, Oregon.

13th.—Colo., Dak., Nebr., Nev., Oregon.

14th.—Dak., Ill., Minn., Nebr., Nev., Oregon.

15th.—Dak., Me., Mich., Minn., Mont., Nebr., Nev., Oregon.

16th.—Colo., Ill., Ind., Iowa, Mich., Nebr., N. Y., Ohio, Oregon, Pa., Wis.

17th.—Conn., Ill., Iowa, Me., Mass., Mich., Nev., N. H., N. J., N. Y., Ohio, Oregon, Pa., Vt., Wash., Wis.

18th.—Conn., Iowa, Me., Mass., Minn., Nev., N. H., N. J., N. Y., Oregon, Pa., Vt.

19th.—Iowa, Me., Mich., Nev., N. H., Oregon, Wis.

20th.—Mont., Nev., N. C., Ohio, Oregon, Wash.

21st.—Dak., Mass., Minn., Mont., Nev., N. H., Oregon, Pa.

22d.—Dak., Minn., Mont., Oregon, Wash.

23d.—Dak., Ill., Iowa, Mich., Minn., Mo., Mont., Nebr., Oregon, Pa., W. Va., Wis.

24th.—Ark., Colo., Conn., Dak., Ill., Ind., Iowa, Ky., Me., Mass., Mich., Mo., N. H., N. Y., N. C., Ohio, Oregon, Pa., Tenn., Vt., Va., W. Va., Wis.

25th.—Colo., Conn., Dak., Ind., Md., Mass., Mich., Minn., N. J., N. Y., N. C., Ohio, Oregon, Pa., S. C., Tenn., Vt., Va., W. Va.

Table of comparative maximum and minimum temperatures for September.

State or Territory.	Station.	For 1887. Max.	For 1887. Min.	Since establishment of station. Max.	Year.	Min.	Year.	Length of record.
		°	°	°		°		Years
Alabama	Mobile	96.2	53.2	96.0	1881	53.0	1871	17
Do	Montgomery	98.8	50.0	97.0	1875, 1884	51.5	1876	15
Arizona	Yuma	105.4	62.5	113.0	1879	50.0	1882	13
Do	Fort Grant	88.9	56.7	96.0	1879	47.0	1881	9
Arkansas	Fort Smith	96.9	45.0	99.9	1884	39.6	1883	5
Do	Little Rock	97.0	50.1	97.0	1881	47.0	1881	9
California	Los Angeles	91.0	49.2	108.5	1885	44.0	1880	11
Do	San Francisco	89.0	49.9	93.9	1886	50.0	1874, 1880, 1881, 1882	17
Colorado	Denver	87.6	35.0	93.0	1878	28.0	1873	16
Do	Pike's Peak	51.3	15.4	55.0	1875	6.0	1876	14
Connecticut	New Haven	77.7	35.8	100.0	1881	35.0	1879	15
Dakota	Bismarck	85.3	28.0	95.0	1885	10.0	1876	14
Do	Deadwood	80.0	33.3	91.0	1881	28.0	1884	9
Dist. of Columbia	Washington City	89.6	42.0	104.3	1881	38.0	1879	17
Florida	Cedar Keys	90.6	62.2	94.0	1881	64.0	1880	8
Do	Pensacola	93.6	58.8	93.5	1884	57.3	1882	8
Georgia	Augusta	98.2	44.9	97.0	1875	48.0	1876	15
Idaho	Boisé City	93.4	33.2	96.0	1878	27.9	1886	11
Illinois	Cairo	94.6	44.0	97.0	1881	42.0	1876	16
Do	Chicago	90.0	41.0	93.9	1881	37.0	1872	16
Indiana	Indianapolis	93.1	34.0	94.5	1881	35.0	1875	15
Indian Ter.	Fort Sill	96.0	48.2	100.0	1881	47.0	1880	11
Iowa	Dubuque	87.6	37.7	94.2	1881	33.0	1873	15
Do	Des Moines	92.3	38.1	93.2	1886	34.0	1879	10
Kansas	Dodge City	96.5	38.3	99.3	1881	30.0	1876	14
Do	Leavenworth	94.7	43.0	101.0	1882	37.0	1876	17
Kentucky	Louisville	94.5	42.3	99.0	1881	42.0	1875, 1876	16
Louisiana	New Orleans	96.0	60.1	92.3	1884	58.0	1871	17
Do	Shreveport	100.0	53.8	100.1	1881	47.0	1881	15
Maine	Eastport	72.0	37.0	82.8	1884	35.0	1875	15
Do	Portland	74.9	36.5	94.5	1881	37.0	1875	16
Maryland	Baltimore	87.9	42.2	101.0	1881	40.0	1873, 1879	16
Massachusetts	Boston	80.3	40.3	101.5	1881	34.0	1879	17
Michigan	Marquette	82.0	32.8	97.0	1874	28.0	1883	14
Do	Grand Haven	82.1	31.9	85.0	1878	30.0	1879	15
Minnesota	Saint Vincent	85.4	18.5	89.0	1883	17.0	1883	8
Do	Saint Paul	83.2	33.5	94.0	1878	30.0	1873	15
Mississippi	Vicksburg	90.3	52.2	98.0	1881	48.0	1871	16
Missouri	Saint Louis	97.4	44.8	101.5	1881	40.0	1875	17
Montana	Fort Assinaboine	83.6	33.1	92.7	1885	25.0	1884	8
Do	Helena	81.1	31.8	88.1	1885	30.0	1880, 1882	8
Nebraska	North Platte	94.0	30.3	101.0	1881	21.0	1876	14
Do	Omaha	92.1	38.9	98.8	1881	30.0	1873	15
Nevada	Winnemucca	88.4	28.0	94.0	1878, 1880	22.0	1880 1881,	9
New Hampshire	Mt. Washington	56.0	17.5	65.0	1880	11.0	1879	16
New Jersey	Atlantic City	78.4	40.5	94.0	1880	43.0	1875	14
New Mexico	Santa Fé	80.0	38.0	90.0	1879	27.0	1880	14
New York	Buffalo	79.2	36.5	88.1	1884	35.0	1878	15
Do	New York City	84.4	41.3	100.2	1881	30.0	1872	16
North Carolina	Charlotte	93.9	39.5	94.0	1881	43.0	1879	9
Do	Wilmington	91.0	42.3	96.0	1872	47.0	1879	17
Ohio	Cincinnati	93.0	40.2	95.0	1881	40.9	1885	17
Do	Sandusky	95.0	42.0	95.8	1881	38.0	1880	11
Oregon	Portland	86.6	40.3	93.0	1886	39.0	'73, '77, '82	15
Do	Roseburg	95.1	36.3	95.5	1886	34.6	1881	10
Pennsylvania	Pittsburg	91.5	36.3	101.6	1881	35.0	1879	15
Do	Philadelphia	85.7	42.4	101.5	1881	43.0	1879	17
Rhode Island	Block Island	74.0	47.0	86.5	1881	41.5	1883	8
South Carolina	Charleston	90.1	49.2	94.0	1876	54.0	1879	15
Tennessee	Knoxville	94.0	37.8	97.1	1881	40.0	1871	17
Do	Memphis	98.7	49.2	98.0	1881	44.0	1875	15
Texas	Brownsville	90.1	62.9	96.0	'77, '78, '79, '83, '84	57.0	1883	11
Do	Fort Elliott	95.4	38.7	98.0	1881	37.0	1880	6
Utah	Salt Lake City	89.9	39.5	93.0	1875	36.0	1881	14
Virginia	Lynchburg	96.9	36.8	98.3	1881	40.0	1875, 1879	15
Do	Norfolk	91.4	46.0	96.0	1880	50.5	1875	17
Washington Ter.	Spokane Falls	84.1	31.7	87.0	1882	31.0	1881	7
Do	Olympia	82.8	34.2	82.6	1886	31.0	1877	11
Wisconsin	La Crosse	85.0	33.5	92.0	1873	31.0	1873	15
Do	Milwaukee	85.9	37.8	94.0	1872, 1874	32.0	1876	17
Wyoming	Cheyenne	86.0	32.7	98.0	1875	23.0	1878	14

26th.—Colo., Conn., Dak., D. C., Ind., Md., Mass., Mich., N. H., N. J., N. Y., N. C., Ohio, Oregon, Pa., Vt., Va., W. Va.

27th.—Conn., Dak., Mass., Mont., Nebr., N. H., N. Y., Pa., R. I., Vt.

28th.—Colo., Dak., Mich., Minn., Nebr., N. Mex.

29th.—Colo., Dak., Mich., Minn., Nebr., N. H., N. Mex.

30th.—Dak., Nebr.

The following reports of injury to vegetation by frost have been received:

Fort Bidwell, Modoc Co., Cal.: the heavy frost which occurred on the 1st was the first of the season; vegetables and flowers were seriously damaged.

Linkville, Klamath Co., Oregon: the heavy frost which occurred on the 1st injured crops to a great extent. Another damaging frost occurred on the 12th.

Moorhead, Minn.: the first killing frost of the season occurred on the morning of the 10th; tender vegetation froze.

Fort Totten, Dak.: the heavy frost of the 12th caused some damage to late vegetation; on account of the season being so far advanced the damage was not serious.

Oswego, N. Y.: heavy frost was observed on the morning of the 12th in

portions of Lewis county (adjoining Oswego county to the eastward), and more or less injury was done to crops, especially in the uplands.

Fort Buford, Dak.: the first frost of the season occurred on the 13th, and caused some injury to vegetation.

Albany, N. Y.: the first frost of the season occurred on the 17th, causing slight damage to late vegetation.

Vienna, Johnson Co., Ill.: a heavy frost occurred during the night of the 23d–24th, causing considerable damage.

Owensborough, Daviess Co., Ky.: a heavy frost occurred throughout this county during the night of the 23d–24th. Tobacco in the lowlands, which, owing to the drought, constitutes about three-fourths of the entire crop, was seriously injured, and vegetables were killed.

Grand Haven, Mich.: heavy frost occurred on the morning of the 24th, doing considerable damage to tender vegetation throughout this part of Michigan.

Jackson, Cape Girardeau Co., Mo.: the first frost of the season occurred on the morning of the 24th; vegetation was only slightly injured.

Sycamore, DeKalb Co., Ill.: the heavy frost on the 24th did much damage in this county.

Champaign, Champaign Co., Ill.: heavy frost occurred on the morning of the 24th, killing tender vegetation. Reports from Duquoin, Perry Co., Tolono, Champaign Co., Marshall, Clarke Co., and Taylorville, Christian Co., state that frosts occurred on the above date in those localities, but no serious injury resulted.

College Hill, Hamilton Co., Ohio: the first frost of the season occurred on the 24th; tomato, pumpkin, and cucumber vines were seriously injured.

Columbus, Ohio, the light frost of the 24th caused slight damage to crops in this vicinity; reports from the northwestern counties indicate that frost seriously injured tobacco.

Bristol, Sullivan Co., Tenn.: a heavy frost occurred during the night of the 24–25th. Farmers report that the tobacco crop was seriously injured.

Henderson, Henderson Co., Ky.: the damage done to the tobacco crop by the frost of the 25th is estimated at about 10 per cent. of the entire crop.

Hopkinsville, Christian Co., Ky.: the frost on the morning of the 25th damaged tobacco considerably on low ground, but on high land the damage was slight.

Wytheville, Wythe Co., Va.: heavy frosts occurred on the mornings of the 25th and 26th; no serious damage resulted.

Blue Ridge, Botetourt Co., Va.: light frosts occurred on the 24th, 25th, and 26th; no appreciable damage was done to tobacco.

Lynchburg, Va.: heavy frost was reported in the surrounding country on the morning of the 25th, doing considerable damage to crops, particularly tobacco.

Variety Mills, Nelson Co., Va.: the first frost of the season occurred on the 25th; sweet potato vines, corn, beans, and tobacco sustained serious injury; this is the earliest damaging frost that has occurred at this place during the last thirteen years.

Asheville, Buncombe Co., N. C.: a heavy frost occurred during the night of the 24–25th; about one-fourth of the outstanding tobacco was damaged.

Henderson, Vance Co., N. C.: tobacco on lowlands was slightly damaged by frost on the 25th.

Statesville, Iredell Co., N. C.: the heavy frost on the 25th did considerable damage to tobacco.

Raleigh, N. C.: the first frost of the season occurred on the 25th, and although no damage occurred in this vicinity, reports from the western part of the state indicate that the tobacco crop sustained serious injury.

Columbia, S. C.: light frost is reported to have occurred during the night of the 24–25th, injuring tender plants.

Baltimore, Md.: "The Sun" of the 28th states that although the frost on the morning of the 26th was quite heavy throughout the lower counties of Maryland, no considerable damage seems to have resulted.

Winchester, Frederick Co., Va.: a heavy frost occurred in this vicinity during the night of the 25–26th, injuring all kinds of vegetation.

Abingdon, Washington Co., Va.: about one-third of the tobacco crop was injured by the frosts of the 25th and 26th. Reports from Lovingston, Nelson Co., Buchanan and Fincastle, Botetourt Co., state that the frost on the above dates were light and caused but little damage.

Danville, Pittsylvania Co., Va.: a light frost occurred on the morning of the 25th; the tobacco crop in this vicinity suffered no serious injury in consequence, but considerable damage is reported from Henry county and the counties bordering on the mountains.

Martinsville, Henry Co., Va.: the tobacco crop was more or less seriously damaged by frost on the 26th.

Christiansburg, Montgomery Co., Va.: frosts on the mornings of the 25th and 26th caused considerable damage to the outstanding tobacco.

Winston, Forsyth Co., N. C.: it is estimated that about one-third of the tobacco standing in the fields was damaged by the frost which occurred during the night of the 25–26th. About one-half of the entire crop was standing when the frost came.

Wellsborough, Tioga Co., Pa., 30th: frequent frosts occurred during the month, but no material damage was done until the 26th and 27th, on which dates frost damaged buckwheat and late potatoes in this vicinity.

ICE.

Ice formed in the various states and territories during the month, as follows:

Dakota.—Fort Totten, 16th; Highmore, 23d.

Illinois.—Champaign and Charleston, 24th.

Indiana.—Vevay, 13th, 19th, and 20th.

Iowa.—Albia, ice formed ten miles south of this place on the 16th.

Michigan.—Hudson and Lansing, 23d.

Minnesota.—Moorhead, 15th.

New Hampshire.—Mount Washington, frost work and ice formed on the anemometer cups on the 8th and 25th; and ice formed on water on the 17th; Berlin Mills, 17th.

New Jersey.—Moorestown, 25th and 26th.

New York.—Starkey, ice formed a few miles south of this place on the 17th; Humphrey, 17th and 25th; Factoryville, 26th; Montgomery, ice formed in the lowlands in this vicinity during the night of the 16–17th.

Ohio.—Napoleon and Wauseon, 24th.

Pennsylvania.—Grampian Hills, 26th.

Virginia.—Dale Enterprise, 26th.

Texas.—Thomas C. Osborn, M. D., voluntary observer at Cleburne, reports: "Ice on well rope at 6 a. m. the 29th."

Wisconsin.—Embarras, 16th, 23d, and 24th. Milwaukee, 24th.

Wyoming.—Cheyenne, 27th and 28th.

TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature, as observed at the harbors of the several stations; the monthly range of water temperature; the average depth at which the observations were made, and the mean temperature of the air:

Temperature of water for September, 1887.

Station	Temperature at bottom.				Mean temperature of the air at station.	Average depth of water, feet and tenths.
	Max.	Min.	Range.	Monthly mean.		
	°	°	°	°	°	
Canby, Fort, Wash.	60.8	55.0	5.8	58.0	55.4	14.2
Cedar Keys, Fla.	87.1	77.1	10.0	81.4	77.6	8.1
Charleston, S. C.	82.3	71.6	10.7	76.9	74.0	37.0
Eastport, Me.	53.7	51.3	2.4	52.1	54.6	17.6
Galveston, Tex.	85.9	71.7	14.2	81.2	79.7	13.5
Key West, Fla.	87.0	79.8	7.2	84.8	81.4	21.9
New London, Conn.	68.3	62.6	5.7	65.4	61.2	12.1
New York City	71.4	62.5	8.9	67.5	63.1	15.4
Pensacola, Fla.	85.4	75.2	10.2	80.5	77.6	18.4
Portland, Me.	59.1	53.4	5.7	56.2	57.8	17.8
Portland, Oregon	64.0	59.5	4.2	61.8	59.6	55.6

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for September, 1887, as determined from the reports of about eight hundred stations, is exhibited on chart iv. In the table of miscellaneous meteorological data are given, for each Signal Service station, the total precipitation, with the departures from the normal. The figures opposite the names of the geographical districts in columns for mean temperature, precipitation, and departures from the normal, show respectively the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal, and subtracting when above.

In portions of the Rio Grande, Missouri, and upper Mississippi valleys, in the northern and middle slopes, southern Rocky Mountain districts, and over portions of the northern plateau and north Pacific coast region, the precipitation for September, 1887, is in excess of the average; it is also excessive in southern and eastern Florida, and in the southern portions of Alabama, Mississippi, and Louisiana. The most marked excess (more than four inches) is that for the Rio Grande Valley,

due to heavy rains accompanying the storm described as number vii under "Areas of low pressure." In the southern plateau the precipitation is unusually heavy for that region, the average for the district being about double the normal amount. The large excess of 1.10, as given in the table of miscellaneous meteorological data, for the northern slope is due in great part to the exceptionally heavy rainfall at Fort Maginnis, Mont., which appears to have been local.

The precipitation for September, 1887, is deficient in the following districts: In the northern portion of Georgia, Alabama, Mississippi, and Louisiana; in Missouri, Arkansas, Indian Territory, Texas (except along the Rio Grande); in the states bordering on the Atlantic, and over an area extending from the lower lakes to, and including, Tennessee, except in the vicinity of Nashville, where a large excess, apparently local, occurs. The greatest deficiency occurs in the south Atlantic states, where the rainfall is less than one-third of the average for the month, while in the west Gulf states but little more than half of the usual amount of rain fell. In New England the deficiency amounts to about 1.00.

The following are some of the most marked departures from the normal precipitation at Signal Service stations where the meteorological records cover eight, or more, years of observations:

Above normal.		Below normal.	
	Inches.		*Inches.*
Brownsville, Tex	5.76	Hatteras, N. C	6.29
Fort Davis, Tex	4.59	Galveston, Tex	5.40
Prescott, Ariz	3.80	Charleston, S. C	5.01
Yankton, Dak	3.77	Southport, N. C	4.69
North Platte, Nebr	3.76	Cedar Keys, Fla	3.85
Nashville, Tenn	3.35	Escanaba, Mich	3.70
Fort Grant, Ariz	3.23	Savannah, Ga	3.47
Rio Grande City, Tex	3.10	Marquette, Mich	3.07

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for a series of years; (2) the length of record during which the observations have been taken, and from which the average has been computed; (3) the total precipitation for September, 1887; (4) the departures of the current month from the average; (5) and the extreme monthly precipitation for September during the period of observations and the year of occurrence:

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1887.	(4) Departure from average.	(5) Extreme monthly precipitation for September.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years.*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.58	6	4.69	+ 0.11	8.44	1886	1.52	1883
California.									
Sacramento	Sacramento	0.13	21	0.06	— 0.07				
Connecticut.									
Canton	Hartford	3.62	26	2.39	— 1.23				
Middletown	Middlesex	3.35	29	1.76	— 1.59				
Wallingford	New Haven	3.46	29	2.12	— 1.34				
Dakota.									
Webster	Day	3.18	5	0.88	— 2.30				
Illinois.									
Aurora	Kane	2.95	9	4.33	+ 1.38				
Collinsville	Madison	3.58	5	2.33	— 1.25				
Golconda	Pope	3.67	10	5.19	+ 1.52				
Mattoon	Coles	3.46	7	3.10	— 0.36	5.30	1885	0.80	1883
Peoria	Peoria	3.53	32	2.53	— 1.00				
Riley	McHenry	3.86	26	4.61	+ 0.75				
Sycamore	De Kalb	3.71	7	3.27	— 0.44				
Indiana.									
Blue Lick	Clark	3.46	6	2.86	— 0.60	6.59	1884	1.05	1883
Connersville	Fayette	2.59	6	2.17	— 0.42	5.00	1884	1.39	1882
Lafayette	Tippecanoe	3.59	8	3.02	— 0.57	4.52	1886	1.88	1882
Logansport	Cass	2.98	33	2.50	— 0.48	7.08	1886	0.24	1882
Sunman	Ripley	3.90	5	3.42	— 0.48	5.85	1884	1.52	1886
Vevay	Switzerland	3.56	21	3.39	— 0.17	6.72	1868	0.47	1871
Worthington	Greene	3.21	6	1.84	— 1.37	5.74	1885	1.68	1882
Iowa.									
Cresco	Howard	4.27	14	7.50	+ 3.23				
Monticello	Jones	4.07	34	6.31	+ 2.24	10.15	1882	0.00	1871
Kansas.									
Independence	Montgomery	3.72	14	3.82	+ 0.10				
Lawrence	Douglas	3.49	20	5.73	+ 2.24				
Wellington	Sunman	3.91	9	2.50	— 1.41				
Yates Centre	Woodson	3.96	7	3.58	— 0.38				

Deviations from average precipitation—Continued.

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1887.	(4) Departure from average.	(5) Extreme monthly precipitation for September.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Maine.		*Inches*	*Years.*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Cornish	York	3.18	30	0.67	— 2.51				
Gardiner	Kennebec	3.22	49	1.05	— 2.17				
Lewiston	Androscoggin	3.40	13	0.88	— 2.52				
Orono	Penobscot	3.25	19	0.95	— 2.30				
Maryland.									
Cumberland	Alleghany	2.67	16	3.68	+ 1.01	8.50	1882	0.38	1886
Fallston	Harford	4.21	17	4.26	+ 0.05	12.95	1876	0.23	1884
Massachusetts.									
Amherst	Hampshire	3.27	53	1.42	— 1.85				
Cambridge	Middlesex	3.49	40	1.12	— 2.37				
Chestnut Hill	Middlesex	2.60	12	1.35	— 1.25				
Framingham	Middlesex	2.32	13	1.29	— 1.03				
Lake Cochituate	Middlesex	3.37	36	1.27	— 2.10				
Ludlow	Hampden	2.82	12	1.45	— 1.37				
Lynn	Essex	2.67	13	1.22	— 1.45				
Mystic Lake	Middlesex	2.45	12	1.54	— 0.91				
New Bedford	Bristol	3.53	74	1.68	— 1.85				
Somerset	Bristol	2.67	17	1.46	— 1.21				
Springfield	Hampden	3.26	40	1.84	— 1.42				
Waltham	Middlesex	3.26	63	1.59	— 1.67				
Nevada.									
Carson City	Ormsby	0.16	9	0.11	— 0.05				
New Brunswick.									
Saint Johns	Saint Johns	3.76	27	2.63	— 1.13				
New Hampshire.									
Concord	Merrimac	3.42	32	0.82	— 2.60				
Hanover	Grafton	2.78	23	0.91	— 1.87				
New Jersey.									
Dover	Morris	3.35	5	1.94	— 1.41				
New York.									
Factoryville	Tioga	2.21	6	2.57	+ 0.36				
Humphrey	Cattaraugus	4.39	3	3.09	— 1.30	4.82	1884	3.09	1887
Palermo	Oswego	3.10	34	2.33	— 0.77				
Ohio.									
North Lewisburg	Champaign	3.26	15	2.05	— 1.21				
Wauseon	Fulton	2.53	15	1.70	— 0.83	5.29	1879	0.55	1871
Pennsylvania.									
Dyberry	Wayne	2.52	18	2.18	— 0.34				
South Carolina.									
Stateburg	Sumter	3.43	7	0.75	— 2.68	6.67	1884	0.75	1887
Texas.									
New Ulm	Austin	5.68	16	3.26	— 2.42	15.08	1874	0.90	1872
Vermont.									
Newport	Orleans	4.37	13	1.92	— 2.45				
Strafford	Orange	3.39	13	1.70	— 1.69	6.30	1882	0.70	1884
Virginia.									
Bird's Nest	Northampton	3.24	19	1.85	— 1.39				
Dale Enterprise	Rockingham	3.58	7	2.10	— 1.48				
Variety Mills	Nelson	2.72	8	2.73	+ 0.01	7.18	1882	0.04	1884
Wytheville	Wythe	3.50	23	4.88	+ 1.38				
West Virginia.									
Helvetia	Randolph	4.37	10	3.49	— 0.88				

SLEET.

Sleet fell on Pike's Peak, Colo., on the 23d, 25th, and 26th; on Mount Washington, N. H., on the 15th and 16th; and at Webster, Dak., on the 22d.

SNOW.

Fort Assinaboine, Mont.: snow was observed falling on the Bear Paw Mountains to the southeast, and on the Sweet Grass Hills to the northwest of this station on the 2d.

Oroville, Cal.: at 1 a. m. on the 5th snow covered the high peaks of the mountains north and east of this place.

Salt Lake City, Utah: the first snow of the season fell on the mountains southeast of this city during the night of the 11–12th.

Fort Maginnis, Mont.: snow fell on neighboring mountains, at an altitude of about 1,000 feet above this station, on the 2d. On the 12th snow was observed on the mountains in this vicinity.

Deadwood, Dak.: light snow fell on the 12th at Lead City, four miles south, and along the stage road twenty miles east of this city.

Farmington, Franklin Co., Me.: snow fell during the morning of the 25th, covering the tops of neighboring mountains.

MONTHLY SNOWFALLS (inches and tenths).

The following monthly snowfalls have been reported:

Mount Washington, N. H., on the 24th and 25th, 2.0; Camp Sheridan, Wyo., 0.6, on the 11th; Pike's Peak, Colo., trace, on the 25th and 26th; Cheyenne, Wyo., trace, on 12th, 25th, and 26th; Fort Maginnis, Mont., trace, on the 12th.

Table of excessive and greatest monthly precipitation for September, 1887.

Station.	Specially heavy.		Largest monthly.
	Date.	Amt.	Amount.
Alabama.			
Mobile	27	4.57	6.21
Marion	17	3.25	
Do	27	2.14	
Evergreen	27, 28	2.07	
Livingston	16, 17	2.10	
Scottsborough	27	2.00	
Selma	27, 28	3.20	
Mount Vernon	26, 27	4.38	
Arizona.			
Fort McDowell	10, 11	2.69	8.23
Do	30	4.11	
Fort Huachuca	9	2.52	
Fort Grant	8, 9	3.34	
Prescott	12, 13	3.09	
Arkansas.			
Monticello	23	2.10	
Russellville	22, 23	2.60	
Dakota.			
Yankton	21	2.14	6.70
Highmore	1, 2	3.50	
Florida.			
Merritts Island			11.96
Jacksonville	17 to 19	7.17	9.40
Alva	18, 19	2.75	7.88
Ft. St. Augustine	19	4.00	7.80
Key West			7.30
Titusville	4	2.17	6.32
Fort Meade	19	2.90	6.27
Do	30	2.10	
Tallahassee	28	3.20	
Duke	19, 20	3.32	
Limona	20	2.08	
Pensacola	27	2.19	
Georgia.			
Toccoa	27, 28	4.21	
West Point	17	2.10	
Columbia	17	2.52	
Cartersville	27, 28	2.95	
Gainesville	27, 28	3.25	
Forsyth	28	2.32	
Albany	27, 28	3.15	
Atlanta	27, 28	2.05	
Indiana.			
Laconia	28	2.05	
Vevay	27	2.05	
Jeffersonville	26 to 28	2.39	
Indian Territory.			
Fort Sill	26	2.00	
Iowa.			
Independence	2 to 5	7.62	12.87
Webster City	3 to 5	5.55	11.32
Do	11	2.20	
Do	21	2.02	
Dubuque			7.63
Cresco	1 to 3	3.72	7.50
Bancroft	2, 3	3.53	6.89
Humboldt	21, 22	2.21	6.75
Monticello	3	2.25	6.31
Fort Madison	27, 28	2.10	
Davenport	3, 4	2.98	
Kansas.			
Wakefield	1, 2	4.41	9.43
Manhattan	1	2.97	6.33
Emporia	2, 3	2.84	6.00
Do	26 to 28	2.39	
East Norway	10	2.20	6.00
Globe	28, 29	2.42	
Oberlin	25	3.20	
Yates Centre	26 to 28	2.36	
Wilson	9, 10	2.36	
Lebo	26 to 28	2.55	
Morse	29	3.00	
Fort Hays	9, 10	3.20	
Brookville	10	2.00	
Bunker Hill	9	3.10	
Carneiro	10	2.14	
Dorrance	10	2.15	
Ellsworth	9	2.50	
Ogallah	9	2.00	
Victoria	9	2.20	
Wakeeney	9	2.50	
Buffalo Park	9	2.00	
Topeka	25, 26	2.09	
Kentucky.			
Greensburg	17	2.61	6.43
Frankfort	27, 28	2.93	
Liberty Hill	27	2.13	
Louisiana.			
Lafayette	27	3.20	6.96
New Orleans	27	2.88	6.51
Coushatta	26, 27	3.17	
Natchitoches	26, 27	2.60	
Grand Coteau	27	3.00	
Monroe	26, 27	2.60	
Maryland.			
Cumberland	11, 12	2.25	
Fallston	11, 12	2.09	
Michigan.			
Adrian	21	2.63	6.66
Kalamazoo	28, 29	2.10	
Hudson	22	2.09	
Coldwater	21, 22	3.38	
Athens	21, 22	2.00	
Grand Haven	5, 6	2.15	
Minnesota.			
Minneapolis	1 to 3	3.13	
Ortonville	26	2.08	
Mississippi.			
Natchez	27	2.50	
Edwards	23	2.00	
Vicksburg	26, 27	2.45	
Missouri.			
Miami			6.48
Sedalia			6.04
Fayette	28, 29	2.10	
Nebraska.			
Genoa	1	10.60	11.34
Tecumseh	1, 2	2.50	
Brownville	25, 26	3.00	
Harvard	1	2.00	
Do	25	2.00	
North Platte	1, 2	2.46	
New Jersey.			
Rancocas			6.25
Moorestown	11, 12	3.68	6.09
Clayton	12	2.86	
Egg Harbor City	12	2.95	
Salem	11	2.90	
Beverly	11, 12	3.39	
Bordentown	12	2.65	
Harrisville	12	2.70	
Imlaystown	12	2.60	
Toms River	11, 12	3.35	
New Mexico.			
Las Vegas	23, 24	2.25	
North Carolina.			
Lenoir	29	3.10	
Statesville	29	3.65	
Ohio.			
Garrettsville	22	2.41	
Hiram	22	2.05	
Oregon.			
Astoria	30	2.70	
Pennsylvania.			
Altoona	12, 13	2.12	
Germantown	12	2.76	
Fallsington	11	2.07	
West Chester	12	2.60	
Philadelphia	11, 12	2.63	
South Carolina.			
Spartanburg	28	2.41	
Tennessee.			
Nashville	17, 18	4.66	6.85
Fostoria	27	4.00	
Florence Station	18	2.29	
Hohenwald	26, 27	2.11	
Chattanooga	27, 28	3.31	
Dyersburg	18	2.01	
Texas.			
Brownsville	21, 22	10.76	13.65
Corpus Christi	24	3.95	9.24
Fort Davis			7.08
Rio Grande City	21, 22	4.55	6.89
Fort Ringgold	22	4.06	6.20
Corsicana	26	3.13	
Virginia.			
Marion	27 to 29	2.67	
University of Va.	28, 29	2.04	
Wytheville	28, 29	2.49	
Variety Mills	28	2.08	
Fort Monroe	30	2.18	
Cape Henry	29	2.60	
Norfolk	29, 30	2.54	
Washington Ter.			
Olympia	30	2.26	
Wisconsin.			
Prairie du Chien	1 to 3	3.85	9.51
Madison	1, 2	2.07	6.07
Lancaster	1 to 3	2.85	

HAIL.

Under the heading "Local storms" will be found descriptions of the more severe hail storms which have occurred during the month. In addition to these, hail was reported to have fallen in the various states and territories as follows:

California.—Fresno, 22d.

Colorado.—Denver, 1st; Colorado Springs, 6th; Pike's Peak, 6th, 16th, 24th, 25th.

Dakota.—Deadwood, 4th; Bismarck, 5th.

Illinois.—Chicago, 23d; Sycamore, 29th.

Iowa.—Muscatine, 29th.

Kansas.—Wakefield, 12th; Salina, 25th.

Maine.—Eastport, 19th.

Nebraska.—North Platte, 1st.

Montana.—Fort Custer, 12th.

New Hampshire.—Berlin Mills, 7th.

New Jersey.—Salem, 25th, 26th.

New York.—Saratoga, 7th.

Ohio.—Elyria, 23d.

Pennsylvania.—Dyberry, 7th.

Washington Territory.—Fort Spokane, 19th.

Wyoming.—Camp Sheridan, 1st, 23d; Cheyenne, 8th, 12th, 24th.

DROUGHT.

Alabama.—Livingston, Sumter Co.: prior to the 16th the weather was very hot and dry; on the 16th and 17th more than two inches of rain fell.

Arkansas.—Little Rock, 12th: the weather is very dry, but at this late date rain would not be of much benefit to crops; the forest grass is burned and stock has to be fed as in winter.

Georgia.—Augusta: the showers on the 23d broke the drought which has prevailed in this section since August 22d; the absence of rain, however, has been very favorable for cotton picking.

Milledgeville, Baldwin Co., 30th: the protracted drought during the month was very damaging to agricultural interests; sweet potatoes, peas, turnips, and pastures suffered seriously.

Illinois.—Mount Vernon, Jefferson Co.: the rain of the 14th greatly benefited pastures and some kinds of vegetables.

Tolono, Champaign Co., 16th: the worst features of the drought of July and August still continue in this region, notwithstanding the showers which have fallen since the middle of the latter month. Nearly all wells are still exhausted, and farmers are compelled to haul water for stock. At Philo, Sadorus, and other towns in Champaign county, the same conditions exist.

Hillsborough, Montgomery Co., 16th: there is great scarcity of water in this section on account of the severe drought.

Galesburgh, Knox Co., 16th: the drought in this vicinity continues, there having been but one slight shower in three weeks. In some parts of the county there is great scarcity of water.

Monmouth, Warren Co., 16th: nearly half of the wells in this county have failed, and there is but one running stream in the county.

Princeton, Bureau Co.: the rain of the 22d was the first since the 3d; it was of great benefit, but more is needed for pastures.

Pekin, Tazewell Co.: a much needed rain, the first for nearly four weeks, fell on the 22d, ending the drought which prevailed during the greater part of the summer.

The "Monthly Weather Review of the Illinois Weather Service" for September, 1887, states:

> The drought of the past season that proved so destructive to the growing crops was broken by daily rainfalls from the 26th to the close of the month. Pastures, late vegetables, and the fall ploughing and seeding have been greatly benefited by these rains.

Indiana.—Vevay, Switzerland Co.: the weather is very dry and dusty; pastures have dried up; water is scarce, and stock is suffering in consequence.

Elkhart, Elkhart Co.: for some time prior to the rain of the 21st drought prevailed in this vicinity; the rain of the above date greatly improved the ground for the reception of fall wheat.

Wabash, Wabash Co., 23d: the drought which prevailed during the greater part of the summer was relieved by the rain of the 22d. On account of the protracted drought much of the winter wheat will have to be resown, involving great expense and labor.

Laconia, Harrison Co.: the first soaking rain since the 9th of June fell on the 26th, 27th, and 28th, breaking the drought and putting the soil in tillable condition.

Iowa.—The following is from "The Daily Gate City" of the 24th, published at Keokuk, Iowa:

Many of the interior towns in Iowa, Missouri, and Illinois are suffering the inconveniences of an inadequate water supply, the continued prevalence of the drought having dried up the creeks and wells, which were partially replenished by the rains of several weeks ago. At that time there had been no rain for six or seven weeks and water was at a decided premium. Crops were damaged, the meadows parched by the sun, and live stock was suffering. Relief was afforded for a short time when the supply again became almost exhausted. The creeks and small streams in southwestern Iowa are nearly dry, and unless there is a rainfall soon people in interior towns will actually suffer. At Pella, on the Rock Island Road, the supply is nearly gone, and water is hauled on the trains from Keokuk. Within a radius of ten miles of Keokuk the supply is short in some localities and live stock is not provided with what it needs.

Fort Madison, Lee Co., 30th: the month has been unusually dry; farmers have had to stop ploughing on account of the dry condition of the soil, and in some places wheat had to be sown the second time. The rain of the 22d moistened the ground sufficiently to permit the resumption of ploughing. At the end of the month the fall wheat was coming up and looking well.

Cedar Rapids, Linn Co., 30th: the water in the Cedar River is still at a very low stage, having risen but little during the month.

Kansas.—Winfield, Cowley Co., 23d: the recent rains have greatly improved vegetation in this part of the state.

Kentucky.—Versailles, Woodford Co., 20th: heavy rains fell during the night of the 17–18th; this put the ground in fair condition for ploughing, but it was not sufficient to replenish the water supply, and farmers are still driving stock long distances for water.

Louisville: the heavy rain which fell throughout the 27th practically ended the drought; it came too late, however, to be of any material good to the crops, but it will renew the supply of water in wells and springs that have been dry for a long time.

Michigan.—Mottville, Saint Joseph Co., 30th: owing to the dry weather the streams are low and wells are failing.

New York.—Lockport, Niagara Co., 11th: reports from Orleans county state that on account of dry weather the potato crop is a failure. Rain is much needed to enable farmers to prepare for seeding fall wheat.

Mississippi.—University, Lafayette Co.: reports from various sections in the state on the 10th showed that drought was general throughout the state and that the cotton crop was suffering seriously. The heavy rain which fell during the night of the 21st–22d was of great benefit, as the cisterns had run dry and water for stock was becoming scarce; it was also of great benefit to growing crops. Another heavy fall of rain occurred on the 24th, terminating the drought in this vicinity.

Vicksburg, 15th: light rain fell at intervals during the afternoon and evening; this rain ended the drought which had prevailed in this vicinity during the last twenty-eight days.

Missouri.—Fayette, Howard Co.: very little rain fell during the month until the last decade, when steady rains fell to the amount of 3.02 inches, which soaked the ground thoroughly and were of much benefit to pastures and seeding.

Ohio.—Napoleon, Henry Co., 24th: the Maumee River at this point is lower than it has been for the last twenty-five years; streams, wells, and many cisterns are dry.

Wauseon, Fulton Co., 30th: the drought in this locality is not yet entirely broken; the ground has been so dry that the seeding of wheat has been much retarded.

Pennsylvania.—Quakertown, Bucks Co., 1st: ploughing for fall seeding is difficult on account of the surface of the ground being very dry.

Tennessee.—Nashville: the drought of the past two months was broken by the rains on the 17th and 18th. Reports received on the 21st from neighboring counties showed that the heavy rains on the above dates did not extend beyond a radius of twelve miles from Nashville.

Chattanooga: the long continued drought in this section was broken by light rains from the 22d to the 28th.

Texas.—San Antonio, Bexar Co., 8th: reports from Frio county state that as a result of the protracted drought the people in the rural districts have been reduced to a state of destitution.

Vermont.—Newport, Orleans Co., 30th: the water in Lake Memphreymagog is lower at this date than it has been at any time for many years; springs which have never been known to fail are now dry.

Virginia.—Rappahannock, Caroline Co., 30th: agricultural interests have been very much injured by the protracted drought in this section of the state; no measurable rain has fallen during the month. The Rappahannock River is unusually low, and nearly all smaller streams and springs are dry.

University of Virginia, Albemarle Co., 30th: on account of the protracted drought the ground is too hard for ploughing, and no grain has been sown in consequence; only 0.31 inch of rain fell from August 25th to September 26th.

West Virginia.—Middlebrook, Randolph Co., 30th: the rains from the 27th to the 29th ended the long and severe drought in this locality; the crops are light in many places, but throughout the mountain districts they gave a fair yield.

WINDS.

The most frequent directions of the wind during September, 1887, are shown on chart ii, by arrows flying with the wind. In the upper Mississippi and Missouri valleys, South Atlantic and east Gulf states the prevailing directions are mostly from the east, southeast, or south; in New England and at stations along Lakes Erie and Ontario they are generally southwest or west; in the Ohio Valley and middle Atlantic states, north and northeast; in the upper lake region and at Rocky Mountain stations, variable; on the Pacific coast, north, northwest, or west.

HIGH WINDS (in miles per hour).

The maximum velocities of the wind for September, 1887, at Signal Service stations where the movements are registered, are given in the table of miscellaneous meteorological data. No velocities of fifty or more miles per hour, other than those given in the table referred to, occurred during the month, with the exception of Brownsville, Tex., 60 miles, se., on the 22d; and Mount Washington, N. H., where velocities exceeding fifty miles were frequent; besides the maximum velocity of 82 miles, sw., on the 7th, at the latter station, there were recorded the following: 81 miles, nw., 8th; 78, nw., 21st; and 79, nw., 22d.

LOCAL STORMS.

Genoa, Nance Co., Nebr.: the heavy rains accompanying the unusually severe storm which occurred on the 4th resulted in much damage to crops in the lowlands; nearly all bridges in this vicinity were washed away.

Key West, Fla.: high northeasterly winds prevailed on the 1st and 2d; on the latter date a maximum velocity of forty-two miles per hour was recorded.

Saint Vincent, Minn.: a severe thunder-storm occurred during the forenoon of the 4th; high winds prevailed from 1.45 to 8.30 p. m.; the maximum velocity, thirty miles per hour from the south, occurred at 8.15 p. m.

Palmyra, Jefferson Co., Wis.: during the evening of the 4th this section was visited by a severe storm of rain and hail, the latter causing serious injury to the tobacco crop.

Sioux Falls, Minnehaha Co., Dak.: an unusually heavy rain storm, accompanied by intense electrical discharges, prevailed

in this vicinity on the afternoon of the 4th and during the night following.

Bismarck, Dak.: during the thunder-storm which began at 10 a. m. and ended at 1 p. m. on the 5th, heavy rain and hail fell from 11.15 to 11.39 a. m. The wind attained a maximum velocity of thirty-one miles per hour from the northwest.

Toledo, Ohio: during the afternoon of the 6th a tornado apparently started near Adrian, Lenawee Co., Mich., and passed southeastward into this (Lucas) county. A large brick school house four miles south of Adrian was demolished. At Sylvania, about eighteen miles northwest of Toledo, buildings were damaged, and all telegraph wires between Adrian and Sylvania were blown down, completely cutting off communication. The buildings of the Northwestern Insane Asylum, near Toledo, were damaged to a considerable extent. From the vicinity of Toledo the track of the tornado, which was from one hundred to two hundred yards in width, was south by east along the line of the Toledo and Ohio Central Railroad. No fencing or tall trees were left standing in this track, and dwellings and barns were unroofed. At Waterville, Lucas Co., and other villages to the southward, much damage was done.

Tiffin, Seneca Co., Ohio: a severe storm occurred on the night of the 6–7th, during which trees, etc., were blown down.

Findlay, Hancock Co., Ohio: at 3 a. m. on the 7th the LaGrange rolling mills and Moore's cable chain works, situated west of the city, were completely wrecked by a tornado. A number of other buildings were blown from their foundations.

Albany N. Y.: during the afternoon of the 7th a severe storm, accompanied by hail, occurred at this place; the hail-stones, which measured half an inch in diameter, caused considerable damage to buildings and vegetation. The most violent part of the storm was of about thirty minutes' duration—from 2.30 to 3 p. m.

Saratoga Springs, Saratoga Co., N. Y.: a thunder and hail storm began at 1.30 and ended at 1.50 p. m. on the 7th; the hail-stones measured three-quarters of an inch in diameter, and caused much damage to windows and sky-lights; about 1,000 panes of glass were broken in a hot-house near this place. The storm's track was from about one-half to three-quarters of a mile wide.

Medina, Orleans Co., N. Y.: a large amount of damage was done to crops in this county by the storm on the night of the 7–8th. It is estimated that $60,000 will not cover the losses sustained.

Fort Maginnis, Mont., 12th: it is reported that on account of the recent heavy rains, the grain and hay crops in this county have been damaged about fifty per cent.

Denver, Colo.: high winds prevailed from 12 m. until 8.40 p. m. on the 12th; a maximum velocity of forty-two miles an hour occurred at 2.10 p. m.

Topeka, Kans.: a high wind, velocity ranging from forty to forty-five miles per hour, prevailed for several hours on the 12th, causing some damage to shade trees.

West Monroe, Oswego Co., N. Y.: a severe thunder-storm occurred during the night of the 13–14th; a number of barns and other buildings were struck by lightning and burned.

Titusville, Fla.: during the afternoon of the 16th the wind, which had been fresh northeasterly, suddenly increased in force at 2.20 p. m., reaching a velocity of forty-two miles per hour; this high wind continued until 2.45 p. m.

Keeler, Cal.: the heavy rain and thunder-storm on the 22d was one of the severest that has ever visited this county. Hail fell for about fifteen minutes, some of the hail-stones being as large as walnuts. A washout occurred on the railroad two miles northwest of this place.

Hatteras, N. C.: high wind prevailed during the afternoon of the 23d, reaching a maximum velocity of forty-six miles per hour from the north at 7.30 p. m.

Chicamicomico, N. C.: during a northeasterly gale on the 23d the schooner "Charles," from Beaufort, N. C., was driven ashore near Oregon Inlet.

Brownsville, Tex.: a thunder-storm passed over this place from the northwest at 7 p. m. on the 26th; the heavy rain which fell between 9.30 and 10 p. m. caused the Rio Grande River to overflow adjacent lowlands.

Amesbury, Essex Co., Mass.: the thunder-storm on the night of the 7–8th was of unusual severity in this vicinity; numerous buildings and other objects were struck by lightning. Reports from Bridgewater, Plymouth Co., state that a severe storm occurred at that place during the afternoon of the 7th, and that considerable damage was done by lightning.

WATER-SPOUTS.

Captain Mackay, of the s. s. "Alvena," reports: "September 18th, 11 p. m. Greenwich time, in N. 18° 30′, W. 74° 08′ (Hayti), with light variable winds; a heavy cloud appeared about four miles out at sea, extending towards Caymite Island, from which were seen seven water-spouts, one being very large and drawing up large quantities of water."

COTTON REGION REPORTS.

In the following table are given the means of the maximum and minimum temperatures, and the average rainfall for the cotton-belt districts during the month. For the purpose of comparison the means for the five preceding years are also given.

A slight excess over the average rainfall occurs in the districts of New Orleans, Atlanta, Montgomery, and Mobile; elsewhere the deficiencies occur, those for the districts of Savannah and Charleston exceeding two inches.

The temperature, as compared with the average, shows departures both above and below the normal, though generally slight.

Temperature and rainfall data for the cotton districts, September.

Districts.	Rainfall.			Temperature.							
				Maximum.			Minimum.			Extremes for Sept., 1887.	
	Average for Sept. of five preceding years.	Average for Sept., 1887.	Departures.	Mean for Sept. of five preceding years.	Mean for Sept., 1887.	Departures.	Mean for Sept. of five preceding years.	Mean for Sept., 1887.	Departures.	Max.	Min.
	Inch.	*Inch.*	*Inch.*	°	°	°	°	°	°	°	°
New Orleans	3.16	3.66	+ 0.50	87.5	87.4	— 0.1	66.8	65.6	— 1.2	99	46
Savannah	3.76	1.73	— 2.03	86.6	86.9	+ 0.3	67.5	64.2	— 3.3	101	41
Charleston	4.08	0.96	— 3.12	84.7	84.5	— 0.2	64.8	62.1	— 2.7	101	30
Atlanta	2.62	2.95	+ 0.33	83.9	83.3	— 0.6	63.2	61.4	— 1.8	97	36
Wilmington	4.32	1.48	— 2.84	82.6	81.4	— 1.2	62.2	59.4	— 2.8	101	26
Memphis	2.52	2.28	— 0.24	84.7	85.8	+ 1.1	61.2	61.9	+ 0.7	100	38
Galveston	4.23	3.05	— 1.18	87.8	88.0	+ 0.2	66.4	68.0	+ 1.6	100	39
Vicksburg	3.60	3.31	— 0.29	87.5	88.1	+ 0.6	65.2	67.9	+ 2.7	100	52
Montgomery	1.77	2.73	+ 0.96	86.4	85.3	— 1.1	64.1	63.4	— 0.7	99	40
Augusta	2.86	1.19	— 1.67	85.0	84.5	— 0.5	65.3	62.0	— 3.3	101	38
Little Rock	2.64	1.15	— 1.49	86.2	87.2	+ 1.0	60.3	60.8	+ 0.5	101	30
Mobile	1.95	2.69	+ 0.74	88.2	89.1	+ 0.9	65.1	60.4	— 4.7	105	32

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

Fort Buford, Dak., 25th: the Missouri River has been falling since the 4th, and navigation at this time is seriously impeded on account of low water.

Shreveport, La.: navigation on the Red River was suspended on account of low water on the 1st; by the 29th the river had risen sufficiently to permit the resumption of navigation.

Louisville, Ky., 19th: the present low stage of water in the Ohio River is almost without precedent, and navigation is only practicable for boats of light draught.

In the following table are shown the danger-points at the various river stations and the highest and lowest depths for September, 1887, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, September, 1887 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water. Date.	Highest water. Height.	Lowest water. Date.	Lowest water. Height.	Monthly range.
Red River:						
Shreveport, La	29.9	30	5.5	8 to 11	*—0.6	6.1
Arkansas River:						
Fort Smith, Ark	22.0	11	4.5	1	1.7	2.8
Little Rock, Ark	23.0	15	3.8	2	1.7	2.1
Missouri River:						
Omaha, Nebr.	18.0	13	11.9	30	7.3	4.6
Leavenworth, Kans	20.0	15	13.4	27	8.2	5.2
Mississippi River:						
Saint Paul, Minn	14.5	4	2.6	24 to 26, 30	1.8	0.8
La Crosse, Wis	24.0	10	5.7	1	2.7	3.0
Dubuque, Iowa	16.0	13	5.8	1, 2	2.6	3.2
Davenport, Iowa	15.0	15 to 19	3.8	1	1.4	2.4
Keokuk, Iowa	14.0	20 to 22	3.6	4	1.0	2.6
Saint Louis, Mo	32.0	19	11.6	5 to 7	6.7	4.9
Cairo, Ill	40.0	22	7.8	11	3.8	4.0
Memphis, Tenn	34.0	24, 25	6.8	13	4.4	2.4
Vicksburg, Miss	41.0	29	3.1	17, 18	*—0.1	3.2
New Orleans, La	13.0	1	4.1	10, 11	1.9	2.2
Ohio River:						
Pittsburg, Pa	22.0	7	6.1	12, 23	5.5	0.6
Cincinnati, Ohio	50.0	1, 2	4.1	17	2.8	1.3
Louisville, Ky	35.0	12	3.0	26	2.4	0.6
Cumberland River:						
Nashville, Tenn	40.0	28, 29	0.9	14 to 16	*—0.3	1.2
Tennessee River:						
Chattanooga, Tenn	33.0	1	4.0	19, 25	1.3	2.7
Monongahela River:						
Pittsburg, Pa	29.0	7	6.1	12, 23	5.5	0.6
Savannah River:						
Augusta, Ga	32.0	30	14.0	26	5.6	8.4
Sacramento River:		[30				
Red Bluff, Cal	.....	2 to 9, 12 to	0.5	1, 10, 11	0.4	0.1
Sacramento, Cal	.....	1 to 11	7.3	12 to 30	7.2	0.1
Willamette River:						
Portland, Oregon	.....	1	5.7	26 to 28	2.0	3.7

* Below bench mark.

FLOODS.

Fort Maginnis, Mont., 2d: the rains of the past four days have been the heaviest ever known in this section. The Missouri River rose twelve feet in three hours, carrying away property valued at from $8,000 to $9,000. Considerable damage was also done to grain and hay.

Poplar River, Mont.: the heavy rain northwest of this station caused a rise of four feet in the Missouri River on the 2d.

Fort Buford, Dak., 3d: on account of the recent heavy rains the Missouri River has risen very rapidly, and reports from the Yellowstone Valley state that the creeks are overflowing and partly flooding the surrounding country.

Tucson, Ariz.: heavy rains caused freshets in the Santa Cruz and Rillito rivers on the 9th. Several miles of the Southern Pacific Railroad track and some bridges in the vicinity of Pantano were washed away.

The Chicago "Times" of the 13th contained the following:

TUCSON, ARIZ., *September* 13.—The extent of the destruction to the railroad by washouts is much greater than at first supposed. * * * One filling fifty feet high on the Dragoon grade is washed out for eight miles. It will take three weeks to repair the washed out places between Benson and Tucson so that trains can pass over the road. * * * The present is the most destructive washout yet suffered by the Southern Pacific Road, and it will cost not less than $200,000 to repair the damage. A through wire to the east was made to day. The heavy rains of yesterday extended into Sonora, where five miles of track and three bridges were washed out on the Sonora Road. The streets of Tucson are flooded with perishable freight for the eastern market.

Brownsville, Tex.: the Rio Grande River began to overflow on the 13th, and continued to rise on subsequent dates; by the 27th much of the adjacent country was flooded. On the latter date the river was higher than has been known for twenty years. At the close of the month the river was still overflowing.

New Orleans, La.: the high tides caused by the strong easterly winds of the 18–19th, with rainfall on the latter date, resulted in washouts along the Louisville and Nashville Railroad between this city and Mobile.

Comfort, Kendall Co., Tex.: all streams in this region were much swollen by the heavy rains on the night of the 25–26th, and numerous bridges were washed away.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were observed during the month, as follows: 1st, Butlerville, Ind. 6th, Berlin Mills, N. H. 9th, Henry and Webster, Dak.; Clayton, N. J. 11th, Berlin Mills, N. H. 12th, Poplar River, Mont. 13th, Starkey, N. Y. 14th, Webster, Dak.; Duluth, Minn. 15th, Bismarck and Fort Buford, Dak.; Traverse City, Alpena, and Marquette, Mich.; Duluth and Moorhead, Minn.; Poplar River and Fort Assinaboine, Mont.; Madison, Wis. 16th, Fort Totten and Webster, Dak.; Gardiner, Me.; Moorhead, Minn.; Northfield, Vt. 17th, Gardiner, Me.; Thornville, Mich.; Saint Vincent, Minn. 18th, Clayton, N. J. 21st, Fort Totten and Webster, Dak.; Marquette, Mich.; Duluth and Moorhead, Minn. 22d, Fort Totten, Dak.; Saint Vincent, Minn.; Poplar River, Mont. 23d, Webster, Dak.; Fort Maginnis, Mont. 24th, Windsor, Ill.; Taunton, Mass.; Thornville, Mich. 25th, Voluntown, Conn.; Bismarck, Fort Totten, and Webster, Dak.; Bulterville, Ind.; Bar Harbor, Cornish, Gardiner, Orono, Eastport, and Portland, Me.; Blue Hill Observatory, Fall River, Newburyport, North Truro, Somerset, and Taunton, Mass.; Birmingham, Harrisville, Lansing, Thornville, Traverse City, Alpena, Port Huron, and Marquette, Mich.; Fort Maginnis and Poplar River, Mont.; Concord, N. H.; Tiffin, Ohio; Fort Laramie, Wyo. 26th, Thornville, Mich.; Poplar River, Mont. 27th, Fort Totten, Fort Buford, and Webster, Dak.; Alpena, Mich.; Saint Vincent and Duluth, Minn.; Fort Maginnis, Poplar River, and Fort Assinaboine, Mont.; Mount Washington, N. H. 28th, Moorhead, Minn.

The most noteworthy auroral displays of the month were those of the 25–27th, which were observed at stations in the states and territories along the northern border from Montana eastward to the New England coast. Reporting stations were most numerous on the evening of the 25th, although at that time over Dakota, Minnesota, Wisconsin, and northern New York, cloudiness prevailed, through which the aurora could not be seen; but over the greater part of the Lake region, in the upper Missouri valley, and New England, the weather was clear and the aurora was observed at many stations.

On the evening of the 26th an area of cloudiness overspread the upper Mississippi valley, Lake region, and portions of New England, and the aurora was noted at but two stations, viz., Poplar River, Mont., and Thornville, Mich.

On the following evening cloudiness covered the greater part of the country east of the Mississippi, but the weather was clear in the northern part of the upper lake region and to the westward, where numerous stations observed auroral displays.

Concerning the displays of the 25–27th, the following notes are given:

Fort Totten, Dak.: though the sky was partially obscured on the evening of the 25th it was sufficiently clear to indicate the existence of a brilliant and prolonged auroral light, with shooting beams reaching nearly to the zenith. The display was seen from 9.30 to 11.30 p. m.

Escanaba, Mich.: a faint and poorly defined auroral light was observed from 8.00 p. m. on the 25th until 1.30 a. m. the following date; the aurora assumed fantastic shapes and colors extending upward to an altitude of 30°; it covered only a narrow part of the horizon.

Bismarck, Dak.: a bright yellow auroral light was observed at 8.25 p. m. on the 25th; it rapidly spread from azimuth 120° to 255°; beams of light shot upwards to a height of 90°. At 10 p. m. the light began to fade, and by 11 p. m. it had disappeared.

Mackinaw City, Mich.: a brilliant aurora appeared at 7.30 p. m. on the 25th; it was of a light yellow color and presented the appearance of a huge curtain hanging in folds. The light extended from the northeast to the northwest, and reached an altitude of 90°; for a short time the light extended to 10° south of the zenith. The aurora gradually assumed an elliptical shape, still retaining its curtain-like appearance, its long diameter being about 100° in length, and crossing the magnetic meridian at right angles at altitude 35°. The maximum intensity occurred at about 8.10 p. m.; after that time it gradually faded, and

at 8.40 p. m. it had entirely changed its shape and appeared as a narrow arch of about 2° in width, extending from the northeast to the northwest, and crossing the magnetic meridian at altitude 10°. The aurora was scarcely visible at 11 p. m.

Alpena, Mich.: an aurora was observed at 7.00 p. m. on the 25th, consisting of brilliant streamers and "merry dancers," extending to an altitude of 65° and covering the horizon from east to west; the aurora had an apparent motion from east to west, and was very brilliant at 11.30 p. m.; the display lasted until daylight of the 26th.

Port Huron, Mich.: a faint auroral light was visible from 9.30 until 10.15 p. m. on the 25th; it consisted of slender streamers reaching an altitude of 50°.

Lansing, Mich., 25th: an auroral light was observed in the north at 7.45 p. m., in the form of a curtain fold, with occasional streamers between northeast and northwest shooting up towards the zenith. The display was not brilliant, and had disappeared at 10.20 p. m.

Mr. Joseph Wood, voluntary observer at Bar Harbor, Me., reports, relative to this aurora, as follows:

"The display of northern lights on the evening of the 25th was the finest we have ever known, and we have seen many and grand exhibitions of the aurora. The brilliant spears of colored light, showing all the hues of the rainbow, flashed and crinkled across the northern heavens from east to west, and shot up in great sheets of flame in the northeast and northwest; the rosy light that passed to the zenith opened itself more than half way down to the southern horizon, forming a scene of grandeur rarely witnessed."

Eastport, Me., 25th: a brilliant auroral arch was observed from 6.40 to 11 p. m., having an altitude of 35°, and extending from northeast to northwest; eight beams or shafts of light, waving and flashing up to the zenith, were observed during the display.

Portland, Me.: a bright aurora was observed from 9 to 10.30 p. m. on the 25th; it consisted of waves of light, moving mostly eastward from a point a little to the east of north, with slender streamers reaching from near the horizon to the zenith.

Fort Totten, Dak.: a brilliant aurora was observed from 9.20 to 11 p. m. on the 27th; the display consisted of two parallel arches, reaching altitudes of 25° and 45°, respectively, with shooting beams extending nearly to the zenith and covering 120° of the horizon.

Saint Vincent, Minn.: an auroral light was observed at twilight on the evening of the 27th in the form of an arch; a partial corona formed about 15° or 20° northeast of the zenith at 9.35 p. m., at which time the arch had become striated and irregular, and at 9.50 had broken up into small fibrous clouds of whitish color. The aurora was most brilliant at 10.55 p. m., after which it faded somewhat, but was quite bright again at 11.15 p. m.

Moorhead, Minn.: an auroral arch was observed at 9.40 p. m. on the 27th; streamers of light shot upward, and waved to and fro as the display increased in brilliancy. At 10.05 the aurora assumed the "curtain" form, and showed a variety of colors. The display ended at 11 p. m.

ELECTRICAL PHENOMENON.

The Signal Service observer at Keeler, Cal., reports that during the evening of the 21st the atmosphere was so charged with electricity as to render telegraphic communication difficult.

THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various states and territories on the several dates as follows:

1st.—Colo., Dak., Iowa, Kans., Mich., Minn., Mont., Nebr., N. Mex., Oregon, Wis., Wyo.

2d.—Colo., Dak., Fla., Iowa, Kans., Mo., Mont., Nebr., N. Y., Tex., Wyo.

3d.—Ark., Dak., Ill., Iowa, Kans., Minn., Mo., Nebr., N. Mex., Wis., Wyo.

4th.—Ark., Dak., Fla., Ill., Iowa, Kans., Minn., Mo., Nebr., Wis.

5th.—Ariz., Cal., Dak., Ill., Ind., Iowa, Kans., Mich., Minn., Nebr., Wis.

6th.—Cal., Dak., Fla., Ill., Iowa, Kans., Mass., Mich., Nebr., N. H., N. Y., Ohio, Oregon, Pa., Wis.

7th.—Ariz., Ark., Colo., Conn., Fla., Ill., Kans., Me., Md., Mass., Nebr., N. H., N. J., N. Mex., N. Y., N. C., Ohio, Oregon, Pa., Tenn., Vt., Va., Wash., W. Va., Wyo.

8th.—Ariz., Colo., Dak., Fla., Iowa, Kans., Mass., Minn., Mont., Nebr., N. C., S. C., Va., Wash., Wis.

9th.—Ariz., Fla., Ill., Ind., Iowa, Kans., Mich., Mo., Nebr., Tex.

10th.—Ariz., Ark., Cal., Colo., Fla., Ga., Ill., Ind. T., Kans., Mo., Tenn., Tex.

11th.—Ark., Colo., Ill., Ind., Ind. T., Kans., Ky., Nebr., N. Y., Ohio, Wash.

12th.—Colo., D. C., Fla., Iowa, Kans., La., Mich., Mont., Nebr., N. J., Ohio, Tex., Utah, Va., Wis.

13th.—Ariz., Ark., Fla., Ill., Ind., Ind. T., Iowa, Kans., Mich., Mo., N. Y., N. C., Ohio, Pa., Tenn., Tex., Va., Wis.

14th.—Ala., Ariz., Ark., Dak., Fla., Ind., Ind. T., Kans., La., Me., Miss., N. Y., N. C., Ohio, Pa., S. C., Tenn., Tex., Va., W. Va.

15th.—Ala., Ariz., Ark., Colo., Fla., Ga., La., N. C., S. C., Tex., Va.

16th.—Ala., Ariz., Colo., Fla., Ga., Miss., Tenn., Tex.

17th.—Fla., Mass., Tex.

18th.—Ariz., Ind. T., Oregon, Tenn., Tex., Va., Wash.

19th.—Ariz., Me.

20th.—Ariz., Dak., Minn., Nebr., Tex., Va., Wis., Wyo.

21st.—Ariz., Cal., Colo., Dak., Ill., Kans., Mich., Nebr., N. Y., Ohio, Tex., Wyo.

22d.—Ariz., Cal., Colo., Ill., Iowa, Kans., Mo., Nebr., Ohio, Tenn., Tex.

23d.—Ariz., Colo., Nev., S. C., Utah, Va.

24th.—Nev., S. C., Utah, Wyo.

25th.—Kans., Nebr., Pa., Tex., Wyo.

26th.—Dak., Ill., Ind. T., Kans., Nebr., Pa., Tex.

27th.—Fla., Ky.

28th.—Fla., Ga., N. C.

29th.—Fla., Ill., Ind., Iowa, Mich., N. C., Ohio, S. C., Va., Wis.

30th.—Conn., Fla., Mass., Mich., N. J., N. Y., N. C., Ohio, Pa., Va.

OPTICAL PHENOMENA.

HALOS.

1st–3d.—Solar and lunar halos were observed on these dates in the central valleys, middle and south Atlantic states, preceding and accompanying the passage of low pressure area number ii from the lower lake region eastward to, and off, the Nova Scotia coast.

4–7th.—Lunar halos were reported from stations in the Mississippi Valley on the 4th and 5th, and from the Ohio Valley on the latter date. Solar halos were noted at widely separated stations east of the Rocky Mountains on the 6th, and on the 7th lunar halos were reported from scattering stations in the Missouri, upper Mississippi and Ohio valleys, and middle Atlantic states.

9–10th.—Solar halos were numerous in New England and the middle Atlantic states on the 9th and on the upper lakes on the 10th.

12th.—Solar halos in the Ohio and central Mississippi valleys.

16th.—Solar halos in the Ohio Valley and middle Atlantic states.

20th.—Solar and lunar holos in the lower lake region and middle Atlantic states.

26–30th.—During this period both solar and lunar halos were frequent in the states bordering on the Atlantic; it was also during these dates that area of low pressure number xi passed from the west Gulf coast to the upper lake region.

The phases of the moon, Washington mean time, during September, as given in "The American Ephemeris and Nautical Almanac" for 1887, are as follows: Full moon, 1st, 18 h. 4.4 m.; last quarter, 9th, 21 h. 55 m.; new moon, 16th, 20 h. 51.6 m.; first quarter, 23d, 11 h. 55.6 m.; apogee, 4th, 22.1 h.; perigee, 17th, 13.7 h.

MIRAGE.

Moorhead, Minn.: a mirage was observed at 3.00 p. m. on the 9th; elevators, buildings, trees, and other objects situated eighteen miles southeast of this place, were plainly seen. All

objects appeared to be considerably elevated above the surface of the ground; the phenomenon continued for more than half an hour.

Mirages were reported to have been observed at the following places:

Salina, Kans., 13th, 29th, 30th.
Henry, Dak., 15th.
Moorhead, Minn., 15th, 18th, 23d, 24th.
Marquette, Mich., 16th, 17th.
Reidsville, N. C., 18th.

MISCELLANEOUS PHENOMENA.

FOREST AND PRAIRIE FIRES.

Kingston, Ontario, 20th: on this date extensive brush fires prevailed in district between the Mississippi and Wilbur Mines.

Brainerd, Crow Wing Co., Minn.: on the 20th forest fires were raging southeast of this place; a large quantity of hay was destroyed.

Oswego, N. Y., 26th: the dense smoke settling over Lake Ontario from forest fires which are burning on the Canadian side renders navigation on the lake very dangerous.

Saint Vincent, Minn.: prairie fires were raging four miles southeast of station on the afternoon of the 20th, and extensive fires were burning southwest of station on the 30th.

Webster, Day Co., Dak., 30th: prairie fires have been very prevalent in this locality since the 20th.

INSECTS.

Quakertown, Bucks Co., Pa., 1st: caterpillars are destroying the leaves on trees and vines to a great extent in this vicinity.

University, Lafayette, Co., Miss., 10th: cotton worms have damaged the cotton crop considerably during the past week.

Lead Hill, Boone Co., Ark., 30th: during the latter part of August and the first half of September chinch bugs were very numerous, and greatly injured the corn in this county. The cotton caterpillar has also reappeared, but has done no serious damage. The bollworm has done considerable injury to cotton in this section.

East Portland, Oregon, 30th: a species of slug has made its appearance in large numbers in this vicinity; it destroys the leaves of plants and also enters the ground and eats sprouting seeds.

METEORS.

Fort Maginnis, Mont.: a meteor of considerable brilliancy passed over this place from southeast to northwest at 12.10 a. m. on the 10th.

Willows, Colusa Co., Cal.: a beautiful meteor was observed in the east at 8.30 p. m. on the 27th; it moved northward about 25°, was as bright as Venus, visible five seconds, and before disappearing separated into several pieces.

During the evening of the 15th a meteor was observed at many stations in New England and the Maritime Provinces of Canada, and by several vessels over adjacent portions of the north Atlantic. While many of the reports concerning this meteor, as given by the public press, were probably exaggerated, the phenomenon was undoubtedly of more than ordinary interest, and the extent of the area over which it was observed and other characteristics noted during its flight were exceptional.

Below are given some of the numerous reports which have reached this office:

Capt. T. L. Rogers, of the s. s. "Wylo," reports: "September 16th, 1.08 a. m., Greenwich mean time, when six miles south of Bird Rocks, Gulf of Saint Lawrence, saw a brilliant meteor descend from an elevation of about 20°, bearing ssw. true, and falling a little to the westward of the perpendicular. It had a very large and bright appearance, and its trail had a vermilion brightness which may have been caused by the hazy state of the atmosphere. The wind was northwest and the weather fine, but a little hazy, and the barometer steady at 30.08."

The following are extracts from an Augusta, Me., "special," dated the 18th, to the "New York World:"

As seen here (Augusta, Me.) it burst forth at a point about midway between the zenith and horizon in the eastern heavens, shooting at about an angle of 45° northward and maintaining its brilliancy until it dropped behind the hills. Its movement was not very rapid and it was several seconds in passing before the vision. An eye witness describes it as being "large as a cart wheel and equipped with a tail thirty feet in length. The nucleus or head rivalled the electric light in brightness, while the brush-like tail was of a pinkish hue."

* * * * * * *

Reports from various country towns are that many of the people were overcome with fear, and some even took refuge in their cellars. Those who did not get a distinct view of the meteor, but saw the light, regarded it as a flash of lightning and listened for the roll of thunder. The fall was two minutes before eight o'clock in the evening and the sky was cloudless.

In Bangor, seventy miles east of here, the meteor was still more prominent and created much excitement.

* * * * * * *

At Halifax its appearance was accompanied by a terrific concussion and a sound heard like that of a heavy clap of thunder, followed by detonations at intervals for several seconds. People rushed from their houses in alarm, fearing that an earthquake was at hand. Indeed, the earth trembled perceptibly. Intelligence from Saint John's, Newfoundland, says that the great fire ball was distinctly seen there, and, after it had disappeared, a thin luminous cloud apparently lay at that point in the heavens where it first burst forth.

Sergeant Paul Daniels, Signal Corps, New York City, furnishes the following report copied from the log of the British s. s. "France," Capt. A. D. Hadley, commanding; Mr. John Rees, first officer:

September 15, 1887, at 9.15 p. m., ship's time, in lat. 41° 31′ N., and long. 63° 43′ W., observed a very large meteor, bearing from the ship north, and travelling in an altitude of about 45° above the horizon; had the appearance of a rocket and was very brilliant, so much so that the ships's deck was so illuminated as to enable a person to pick up a pin. It lasted about six seconds, and was of a light blue tint, resembling sulphur on fire. Weather at the time, clear; many stars visible. Barometer, 30.04 (corrected). Temperature of air, 67°; water 68°, and calm. Weather before and after phenomenon clear, and sea smooth.

Sergeant J. H. Melton, Signal Corps, Boston, Mass., forwards the following abstract from the log of the s. s. "British Crown," Capt. A. Smith, commanding; Mr. Francis Potts, second officer.

September 15, 1887, in 42° 50′ N., 68° 15′ W., at 9 p. m., observed a large meteoric body, intensely bright, fall from the zenith in an easterly direction, which completely illuminated the whole heavens for about five seconds, and disappeared at an altitude of about 10° from the horizon to eastward. It resembled a ball of fire about two feet in diameter and was followed by a bluish trail of light. It at first appeared to fall very near the ship, but passed off to eastward in its descent. Immediately after its disappearance the sky and heavens became blindingly dark.

The following is from the "Portland (Me.) Press" of September 22, 1887:

BOSTON, *September* 21.—Captain Walker, of the Cunard steamship "Cephalonia," just arrived in Boston, reports having seen the meteor on the night of September 15th at 8.30 o'clock. At this time the steamer was in N. 42° 28′, W. 66° 22′. The meteor was observed to the east-northeast, and was very brilliant, sparks radiating from the centre, and it had a long, fiery tail. The sky was brilliantly illuminated for the space of six seconds. The meteor fell into the sea about half a mile from the ship.

The "Bulletin of the New England Meteorological Society" for September, 1887, contains the following:

A large meteor of brief duration was noticed by several observers a little after 20 h. on the 15th. A newspaper report states that it was followed by a terrible roaring noise at Barrington, N. S., where it was seen in the southeast, moving to the south. It appeared overhead at Bar Harbor, Me., and moved southeast. At Grafton, N. H., it was seen in the east or southeast, at an altitude of 25°, first red, then yellow, when it disappeared below the horizon, leaving a long trail visible. At Leominster, Mass., it moved through the eastern sky from Pegasus to Aries. At North Truro, Mass., it fell to the east-northeast. At Nantucket, Mass., and at Setauket, N. Y., the meteor was not seen, but the sky was lighted up by it. It was probably nearly a hundred miles above the earth when it became visible.

Meteors were also observed during the month on the following dates:

1st, Orono, Me. 3d, Starkey, N. Y. 5th, Pekin, Ill.; Orono, Me.; Weldon, N. C. 7th, Cedar Keys, Fla.; Wauseon, Ohio. 8th, Cedar Keys, Fla.; Woodstock, Md. 9th, Fort Sully, Dak.; Trenton, Tenn. 12th, Manatee, Fla.; Harvard, Nebr. 13th, Woodstock, Md.; Kalamazoo, Thornville, and Benzonia, Mich.; Jacksonborough, Ohio; Tatoosh Island, Wash.; Mount Angel, Oregon; Riddleton, Tenn. 14th, Fort Sully, Dak.; Manatee, Fla.; Starkey, N. Y.; Delavan, Wis. 15th, Bar Harbor, Gardiner, and Eastport, Me.; North Truro, Mass. 16th, Yuma, Ariz. 17th, Taunton, Mass.; Kalamazoo, Mich.; Beverly and Egg Harbor City, N. J.; Factoryville, N. Y. 18th, Calumet and Kalamazoo, Mich.; Dover, N. J.; Wauseon, Ohio. 19th Mauzy, Ind.; Egg Harbor City, N. J. 20th, Fort Sully, Dak.; Logansport, Ind.; Wauseon, Ohio; Rappahannock, Va.; Columbia, S. C. 21st, Manatee and Cedar Keys, Fla.; Crete, Nebr.; Yaquina Lighthouse, Oregon; Wytheville, Va.; Vashon, Wash. 22d, Rappahannock, Va. 23d, Webster, Dak.; Titusville, Fla. 25th, Butlerville, Ind. 26th, Marquette, Nebr.; Rappahannock, Va. 28th, Trenton, Tenn. 30th, Fort Sully, Dak.

MIGRATION OF BIRDS.

Geese flying southward.—Nicolaus, Cal., 9th, 12th, 17th; Sacramento, Cal., 15th, 30th; San Diego, Cal., 19th; Fort Buford, Dak., 21st; Salina, Kans., 13th; Grand Haven, Mich., 2d, 9th; Poplar River, Mont., 25th, 28th; Crete, Nebr., 21st; Albany, Oregon, 6th, 10th, 22d; Linkville, Oregon, 11th, 16th, 28th; Wellsborough, Pa., 25th, 26th; Fort Canby, Wash., 4th, 28th; Pysht, Wash., 15th; Port Angeles, Wash., 28th.

Geese flying northward.—Fort Sully, Dak., 24th; Linkville, Oregon, 26th.

Geese flying eastward.—Little Rock, Ark., 23d.

Ducks flying southward.—Little Rock, Ark., 23d; Erie, Pa., 16th; Tatoosh Island, Wash., 2d.

Brants flying southward.—Independence, Kans., 27th.

Cranes flying southward.—Independence, Kans., 27th.

SAND STORMS.

Yuma, Ariz.: a heavy sand storm prevailed from 1.50 to 3.25 p. m. on the 19th; maximum velocity of the wind during the storm, thirty-eight miles per hour.

A sand storm is also reported to have occurred at Fresno, Cal., on the 5th.

SUN SPOTS.

Mr. H. D. Gowey, of North Lewisburg, Champaign Co., Ohio, reports having observed sun spots on the following dates: 3d, 4th, 14th to 21st.

VERIFICATIONS.

In consequence of the urgency of other work the detailed comparison of the tri-daily indications for September, 1887, and the average percentages of verifications, have not been completed in time for publication in this REVIEW. The usual data in connection will, however, appear in the succeeding number, as it is not considered advisable to delay the current issue.

LOCAL VERIFICATIONS.

The following is from the report of the "Michigan State Weather Service" for September, 1887:

Weather and temperature signals are now displayed in one hundred and forty-three towns in the state, and on the baggage-cars of twenty-five trains on seven principal railroads of the state.

The percentage of verification of weather signals for September is as follows: (the verification is taken from reports of displaymen furnished this office monthly) temperature, 82.8 per cent.; weather, 86.5 per cent.; temperature and weather, 84.7 per cent.

The percentage of verification of weather predictions for September on the D., G. H., and M. R'y., is 84.2 for weather and 80.8 for temperature; on the C. & G. T. R'y., weather, 85.3, and temperature, 83.5; P. H. & N. R'y., weather, 83.6, and temperature, 81.5; M. C. R'y, for weather, 84.0, and for temperature, 82.8; G. R. & I. R'y, weather, 80.7, and temperature, 79.5; C. & W. M. R'y, weather, 85.0, and temperature, 83.3.

The following is from the September, 1887, report of the "Minnesota Weather Service:"

Verifications of weather signals for Minnesota were 80 per cent. for weather and 73 per cent. for temperature.

The following is from the September, 1887, report of the "North Carolina Weather Service:"

The percentage of verifications as determined from seven points in the state is as follows: weather, 80.1 per cent.; temperature, 78.2 per cent.

The following is from the September, 1887, report of the "South Carolina Weather Service:"

The percentage of verification of the weather and temperature predictions for the whole state was: for weather, 82.9 per cent.; for temperature, 89.3 per cent.

The following is from the "Tennessee State Board of Health Bulletin" for September, 1887:

The percentage of verification of weather and temperature predictions, furnished daily from the Signal Office at Washington to the various stations in the state during the month, was for the state: weather, 79.1 per cent.; and temperature, 83.2 per cent.

ERRATUM.

July, 1887, REVIEW, page 185, first column, make "Barbadoes, on the 20th, moving east. It then moved eastward," etc., read, "Barbadoes on the 20th, moving *west*. It then moved *westward*," etc.

STATE WEATHER SERVICES.

The following extracts are republished from reports for September, 1887, of the directors of the various state weather services:

The "Alabama Weather Service," P. H. Mell, jr., of the Agricultural and Mechanical College, Auburn, director:

The month of September was singular, both on account of the continued drought over the first two-thirds of the period, and the high range of temperature at all stations during a greater part of the first half of the month. In north Alabama the thermometer reached as high as 104°, and before the close of the month there was a depression of more than 50°; but this cold wave did not strike the state until the last two or three days of the month. The heavy rain of the 16th and 17th that passed over the entire state, accompanied in many sections by violent electric displays, did much damage to both life and property. This storm was evidently the result of the passage of the low pressure across the northern part of the United States. In some sections of Alabama strong winds prevailed, coming from the southwest.

Crops of all kinds have suffered more or less on account of the dry, hot weather that extended over the greater part of the month. And the season was very favorable for the multiplication of many injurious insects. The "Aletia" did great damage to the cotton plant, reducing the yield of staple, in some sections, to quite a low figure. One advantage of the warm dry season was the rapid opening of the cotton; and the farmers were able to pick it out rapidly on account of the many fair days without rain.

Summary.

Temperature (degrees Fahr.).—Monthly mean, 73°.8; highest monthly mean, 78°.6, at Fayette; lowest monthly mean, 66°.5, at Opelika; maximum, 104°, at Fayette, on the 11th and 12th; minimum, 39°, at Evergreen, on the 25th; range for state, 65°; greatest local monthly range, 60°, at Evergreen; least local monthly range, 30°, at Union Springs; greatest daily range, 33°, at Tuscumbia on the 9th; least daily range, 0°, at Bermuda on the 19th.

Precipitation, including melted snow (in inches).—Average for the state, 3.51; greatest, 7.16, at Auburn; least, 1.28, at Pine Apple.

Winds.—Prevailing direction, southwest and southeast.

The "Monthly Review of the Illinois Weather Service," Col. Charles F. Mills, director:

The meteorological features of September, 1887, were varied and noteworthy.

The areas of high and low pressure affecting Illinois to any great degree during the month were as follows: On the 20th a "high" of 30.2 formed in the Northwest Territories; with a steadily increasing pressure it moved southeastward, covering Illinois on a. m. of 24th, and causing the low temperature and killing frost of that date.

On the 26th a "low" was observed central in southern Texas, that moved northeast to Louisiana on the 27th, north to western Tennessee on the 28th, and northwest to central Missouri on the 29th. This "low" was hemmed in by a "high" on the east and a "high" on the west, and after partly filling up, decreasing in energy, found its way out over Lake Michigan on October 1st. This "low" was the cause of the steady rainfall in the state from the 26th to 30th.

The average temperature of the first half of the month was considerably above the normal for that period; and the average for the remainder of the month was considerably below the normal for those dates. The highest daily mean temperature for the state was 82°, on the 6th, and the lowest, 51°, on the 23d. The prevailing dates of the maximum temperatures reported were the 6th, 9th, and 12th, and of the minimum temperatures, on the 24th, with but few exceptions. On the latter date, the first killing frost of the season was reported from all sections of the state, except the extreme southern portion from whence light frost was reported. Ice 1-6 inch thick formed in water troughs on same date at several of the stations reporting.

Local showers were frequent in the northern counties from 1st to 5th, but not a sprinkle of rain fell from the 13th to 20th. In the central and southern divisions, the total rainfall from the 1st to 25th would not average one-third of the amount that fell from the 26th to 30th. Of the fifty-eight stations from which rainfall was reported, five report over five inches, twenty-three from three to five inches, and the remainder from one to three inches.

The average rainfall for Illinois for September, 1887, 3.23, was but 0.06 below the September normal of past ten years. The greatest September average during this period, 5.29, fell in 1885, and the least, 1.16, in 1883. From two-thirds to three-fourths of the total rainfall for the past month fell from the 26th to 30th. The average rainfall for the northern division, 3.36, was 0.15 above the September normal of that section for the past ten years; for the central division, 3.68, was 0.39 above, and for the southern, 2.66, was 0.63 below. The greatest total monthly rainfall reported was 6.25 from Ashland, Cass Co., and the least, 1.01, from Pontiac, Livingston Co. The heaviest daily rainfall reported was 3.71 from Golconda, Pope Co., on the 22d.

Summary.

Temperature (in degrees Fahr.).—Monthly mean, 66°.5; highest monthly mean, 73°.9, at Mound City; lowest monthly mean, 58°.0, at Woodstock; maximum, 102°, at Griggsville on the 8th, Louisiana, Mo., on the 9th, and McLeansborough on the 12th; minimum, 28°, at Pontiac and Woodstock, on the 24th; range for state, 74°; greatest local monthly range, 73°, at Louisiana, Mo.; least local monthly range, 44°, at Oquawka; mean daily range for the state, 20°.5.

Prevailing direction of the wind, east.

The "Indiana Weather Service," Prof. H. A. Huston, of Purdue University, Lafayette, director:

Summary.

Atmospheric pressure (in inches).—Monthly mean, 30.103; maximum observed, 30.463, at Lafayette, on the 16th; minimum observed, 26.688, at Mount Vernon, on the 27th; range for state, .775; greatest local range, .686, at Lafayette; least local range, .540, at Vevay.

Temperature (in degrees Fahr.).—Monthly mean, 66.4; highest monthly mean, 71.6, at Mount Vernon; lowest monthly mean, 62.8, at Columbia City; maximum, 97, at Mount Vernon, on the 12th; minimum, 25, at Mauzy, on the 24th; range for state, 72; greatest local monthly range, 66, at Mauzy; least local monthly range, 48, at Salem.

Precipitation, including melted snow (in inches).—Average for the state, 2.23; greatest, 4.06, at Blue Lick; least, 0.51, at Vevay.

Wind.—Prevailing direction, southwest.

The "Kansas Weather Service," Prof. J. T. Lovewell, Topeka, director:

Three "rainy spells" this month gave to Kansas from 1 to 2.50 inches more rain in the middle and eastern divisions than the September average, while it has been below the average for the month in the western division.

There has been little variation from the normal temperature, except in isolated localities.

The outlook for stock during the coming winter is now more encouraging.

Light frost occurred on the 28th and 29th in the west and northwest, but no damage was reported.

The "Michigan Crop Report" (the state weather service is in charge of N. B. Conger, Sergeant, Signal Corps, at Lansing):

The meteorological features of the state are based upon reports received from forty-three voluntary observers, and eight of the United States Signal Service, and reliable newspaper clippings.

The temperature is slightly below the normal, and also the average rainfall of the state, while the rainfall of the central and southern sections shows an excess.

There have been several severe gales during the month, and one tornado in the southeast portion which did considerable damage.

The work of advancing the display of weather signals is progressing very favorably, and the farmers, generally, express satisfaction for the benefits derived from the display of weather indications on the railway trains.

The mean temperature for September, 58°.2, is 1°.6 below the normal for the state. The temperature is below the normal in the different sections from 1°.2 in the southern section; 3° in the central section; 2°.5 in the northern section; and 2°.3 in the Upper Peninsula. The highest mean daily temperature, 71°, occurred on the 5th and 6th, and the lowest, 44°, on the 23d. The minimum temperature, however, occurred on the morning of the 24th, when a killing frost was reported in all sections. The temperature reached the frost line on eighteen days, when light frosts were reported from the different sections of the state. The maximum temperature throughout the state occurred on the 5th, 6th, and 7th, with but few exceptions. The maximum temperature of the month was 94° on the 3d, at Valley Centre.

The average monthly precipitation for September, 3.12 inches, is 0.34 inch below the normal. The Upper Peninsula has a deficiency of 1.92 inches, northern section, 2.06 inches deficiency; while the central section shows an excess of 0.48 inch, and the southern section 1.18 inches excess. The greatest excess occurred in the southeastern part of the southern section.

General rains fell on the 1st, 2d, 5th, 6th, 9th, 12th, 21st, 22d, 29th, and 30th. The rainfall on the 5th and 6th, and on the 21st and 22d was heavy. The greatest amount recorded in any twenty-four hours is recorded at Jonesville on the 21st and 22d, amount being 2.64 inches. The time was from 7 p. m. of the 21st to 9 a. m. of the 22d.

The rainfall of the 6th was accompanied in many localities by heavy thunder, and by hail in Lenawee county. The size of the hail-stones being estimated to be as large as marbles, and some damage is reported on farms near Adrian.

Of the average annual rainfall there is a deficiency of about 6 inches from February to October, although the excess of the central and southern sections has decreased it slightly.

Summary.

Temperature (in degrees Fahr.).—Highest monthly mean, 69°.9, at Valley Centre; lowest monthly mean, 53°.4, at Calumet; minimum, 19°.5, at Evart, on the 24th; range for state, 74°.5; greatest local monthly range, 66°, at Evart; least local monthly range, 43°, at Charlevoix; greatest daily range, 50°, at Valley Centre, on the 2d; least daily range, 3°, at Hudson, on the 26th.

Precipitation, including melted snow (in inches).—Average for the state, 3.12; greatest, 6.66, at Adrian; least, 0.23, at Evart.

Wind.—Prevailing direction, east.

The "Minnesota Weather Service," Prof. Wm. W. Payne, Carleton College, Northfield, director:

The month was characterized in the southern portion of the state by a temperature below the normal and a slight excess of precipitation in some counties; in the northern portion the temperature was generally above normal and the precipitation deficient. Frosts were of frequent occurrence, but as all crops had been harvested no damage was done. Hail was reported to have fallen on three occasions during the prevalence of thunder-storms. Brilliant auroral displays were observed on several nights. The high winds which occurred throughout the state on a number of days retarded threshing to some extent and blew over hay and straw stacks. Owing to the dry weather in the northern counties stubble and grass frequently took fire from the sparks of passing engines and thus destroyed considerable wheat.

Temperature.—The average for the state is 57°.3; this is 0°.2 above that of the corresponding month of 1886 and 1°.4 below that of 1885. The temperature has been below normal for the month in the southern and eastern portions of the state and above in the Red River Valley and northwestern portion.

Precipitation (in inches).—The average for the state is 2.48; this is 1.57 below that which fell in the corresponding month of 1886 and 0.74 below that of 1885. The rainfall has been very unequally distributed; the southeastern counties generally had an excess while elsewhere there was a deficiency, which was most marked in the northern and northwestern counties.

Winds.—The prevailing direction was from the south.

The "Mississippi Weather Service," Prof. R. B. Fulton, of the University of Mississippi, Oxford, director:

Temperature (degrees Fahr.).—Monthly mean, 76; highest monthly mean, 81, at West Point; lowest monthly mean, 73, at Holly Springs; maximum, 100, at Lake, on 8th; minimum, 44, at Hernando, on the 28th; range for state, 56; greatest local monthly range, 55, at Hernando; least local monthly range, 29, at Biloxi; greatest daily range, 33, at several points; least daily range, 6, at Lamar and Mobile.

Precipitation, including melted snow (in inches).—Average for the state, 3.17; greatest, 11.47, at Biloxi; least, 0.73, at Hernando.

The "Missouri Weather Service," Prof. Francis E. Nipher, of Washington University, Saint Louis, director:

Temperature (in degrees Fahr.).—Monthly mean, 67.5; highest monthly mean, 72.8, at Pro Tem; lowest monthly mean, 62.2, at Ironton; maximum, 104, at Pro Tem, on the 10th; minimum, 28, at Ironton, on the 24th; range for state, 76.0; greatest local monthly range, 73.0, at Louisiana; least local monthly range, 47.9, at Saint Louis (central station).

Precipitation, including melted snow (in inches).—Average for the state, 3.59; greatest, 6.48, at Miami, Saline Co.; least, 1.10, at Ironton.

Wind.—Prevailing direction, south.

The "Nebraska Weather Service," Prof. Goodwin D. Swezey, of Doane College, Crete, director:

The month of September has not been marked by any striking peculiarity, although the late continuance of pleasant weather and delay of frosts have been noticeable and the heavy rains of certain localities have been unusual.

Precipitation.—While the mean rainfall of the southeastern portion of the state (for which section we have records reaching back several years) has been only a little above the normal, a large area in the central part of the state and thence northeastward, has received from five inches upwards, reaching in one locality the astonishing rainfall of twelve inches; the western portion of the state, on the contrary, has had very little, ranging down to less than an inch in the extreme west. The extremes, therefore, have been unusual.

Temperature.—The mean temperature has been almost exactly normal, the extremes not great, and the absence of frosts quite marked. This latter is partly due to the temperature having hardly fallen to the freezing point anywhere, and to the prevalence of cloudy skies, and the number of cloudy days, averaging seven and a half, or nearly double the usual number for September.

The "New England Meteorological Society," Prof. Wm. H. Niles, of the Institute of Technology, Boston, Massachusetts, president:

Reports for the month were received from one hundred and thirty-seven observers.

Atmospheric pressure (in inches).—Monthly mean 30.07 (twenty stations); maximum observed, 30.47, at Albany, on the 17th, and Nashua, on the 18th; minimum observed, 29.37, at Eastport, on the 7th; range for New England, 1.10; greatest local range, 1.07, at Boston; least local range, 0.83, at Nantucket.

Temperature (in degrees Fahr.).—Monthly mean, 57.4 (one hundred and two stations); highest monthly mean, 66.5, at Block Island; lowest monthly mean, 50, at Chelsea; maximum, 86, at Shelburne, on 5th, and Olneyville, on 6th; minimum, 21, at Berlin Mills, on the 24th; range for New England, 65; greatest local monthly range, 60, at Berlin Mills; least local monthly range, 25, at Nantucket; greatest daily range, 47, at West Milan, on the 20th; least daily range, 2, at Newport, R. I., on 12th and 29th.

Precipitation, including melted snow (in inches).—Average for New England, 1.59 (one hundred and twenty-one stations); greatest, 4.43, at Uncasville; least, 0.28, at North Truro.

Wind.—Prevailing directions, southwest and west (eleven stations).

The "New Jersey Weather Service," Prof. George H. Cook, of the Agricultural College, New Brunswick, director:

Temperature.—Monthly mean, 61°.6; highest monthly mean, 67°.1, at Ocean City; lowest monthly mean, 57°.8, at Locktown; maximum, 92°.0, at Oceanic, on the 4th; minimum, 30°.0, at Tenafly, on the 27th; range for state, 62°.0; greatest local monthly range, 55°.0, at Tenafly; least local monthly range, 37°.9, at Atlantic City; greatest daily range, 41°.0, at Tenafly, on the 9th, 18th, 19th; least daily range, 1°.0, at Bordentown, on the 30th.

Precipitation, including melted snow (in inches).—Average for the state, 3.66; greatest, 6.25, at Rancocas; least, 1.62, at Gillette.

The "North Carolina Weather Service," Dr. Herbert Battle, of Raleigh, director:

Temperature.—Mean for September, 1887, 69°.3; normal for September, 70°.0; departures from the normal, —0°.7; highest observed, 101°.0, occurred at Oxford, N. C., on the 14th; lowest observed, 33°.0, occurred at Marion, N. C., on the 25th. Range for the state, 66°.0; mean daily range, 19°.3; highest on record, 101°.0, occurred at Oxford, N. C., in 1887; lowest on record, 33°.0, occurred at Marion, N. C., in 1887. Warmest day, 14°.5 above the normal, on the 14th. Coldest day, 28°.3 below the normal.

Precipitation.—Average precipitation for September, 1887, 2.29 inches; normal for September, 4.33 inches; departure from the normal, 2.04 inches; greatest local daily rainfall, 2.80 inches, on the 28th, at Marion, N. C.; greatest monthly rainfall, 5.41 inches, at Marion, N. C.; least monthly rainfall, 0.43 inch, at Wilmington, N. C. Rainfalls exceeding one inch: Marion, N. C., 2.80 inches; Chattanooga, Tenn., 1.83 inches; Norfolk, Va., 1.78 inches; Lynchburg, Va., 1.84 inches; Reidsville, N. C., 1.50 inches; Raleigh, N. C., 1.18 inches; Weldon, N. C., 1.18 inches; Mount Pleasant, N. C., 1.03 inches.

Relative Humidity.—Mean for September, 1887, 74.2 per cent.; normal for September, 74.4 per cent.; departure from the normal, —0.2 per cent.

Winds.—Prevailing direction for September, 1887, southwest; average direction for September, northeast; highest velocity, thirty-two miles, from the northeast, on the 7th, at Knoxville, Tenn.

Average number of clear days, 11.0; average number of fair days, 13.1; average number of cloudy days, 5.9; average number of rainy days, 6.0.

The "Ohio Meteorological Bureau," Prof. B. F. Thomas, of the Ohio State University, Columbus, president:

A comparison of the month of September, 1887, with the previous Septembers shows that the mean barometric pressure for the month was the highest recorded since the state meteorological work commenced. The mean pressure, 30.09 inches, was .03 inch above the normal, and .02 inch higher than any previous September; the range of pressure during the month was .83.

The mean temperature, 63°.7, was 1°.1 below the average for the five years, and 2°.2 above the normal; highest temperature, 98°, on the 13th, at Georgetown; lowest temperature, 23°, on the 24th, at Paulding; the range of temperature was 75°, being the greatest range recorded; greatest daily range of temperature, 65°, on the 6th, at Paulding; least daily range of temperature, 2°, on the 11th and 16th, at Logan and Youngstown; the mean daily range, 22°.5, was only 0°.3 below the average.

The rainfall, 2.17 inches, was 0.79 inch below the average, and 0.55 below the normal, and was the lightest so far recorded. The greatest rainfall recorded was 3.78 inches at Cleveland (Hyde); the least, 1.12 inches at Napoleon.

Local rains occurred in the northern section on the 4th, 5th, 8th, and 9th. In the middle and southern sections on the 18th.

Warm and cool waves alternated over the state on the following dates: Warm waves—1st; 4th to 8th; 12th to 14th; 18th to 22d; 28th to end of the month. Cool waves—2d to 4th; 8th to 12th; 14th to 18th; 22d to 28th.

The cool wave from the 22d to 28th gave the lowest temperature so far recorded during September, the minimum noted being 23°, on the 24th, at Paulding; the warm wave lasting from the 12th to 14th gave the highest, 98°, on the 13th, at Georgetown. The different sections gave the following means: northern, 60°.9; middle, 63°.9; southern, 66°.2.

Average number of clear days, 9.0; average number of fair days, 12.0; average number of cloudy days, 9.0; average number of days on which rain fell, 10.8; least number of days on which rain fell, 6, at New Bremen; greatest number of days on which rain fell, 18, at Akron; mean monthly rainfall, 2.17 inches; average daily rainfall, 0.72 inch.

Prevailing direction of wind, northeast.

"Oregon Weather Service," report prepared by B. S. Pague, Private, Signal Corps:

Temperature.—The mean temperature for the month was below the normal in the northern part of the Willamette Valley, in the Columbia River basin, from the Dalles to the sea, and along the immediate coast; it was above the normal from Albany southward in the interior valleys, and nearly normal in eastern Oregon. The greatest excess was at Fort Klamath, the greatest deficiency at Bandon, on Coos Bay. From the 1st to the 5th and from the 11th to the 23d the temperature was below the normal over the entire state; from the 19th to the 21st occurred the extreme lowest. On the 6th a warm wave passed over the state, the highest reported being 90°, at East Portland, again on the 27th another warm wave, the highest, 95° at Roseburg. The unusual warmth during the last six days of the month caused the temperature to rise from two to four degrees. The mean of the state was 57°; Roseburg and Ashland, the highest means, 61°, and Fort Klamath, in the southern mountain region, the lowest, 51°.

Precipitation.—The rain fell in showers, the greatest number, eleven, at Astoria, the least, two, at Lakeview. A heavy warm rain fell in the northern part of the state on the 30th, on October 1st in southern part. The greatest excess, at Portland; the greatest deficiency, at Bandon. There has been no marked general rain storm to indicate the commencement of the "rainy season." For the season from July 1st the rainfall is generally below the average.

Weather.—Smoke was occasionally observed; however, it was generally clear, about twenty days of "Indian summer," very cool nights and warm afternoons.

Winds.—The winds were northerly in the Willamette Valley, southwesterly along the coast, and westerly in the other sections of the state.

The "Pennsylvania State Weather Service," prepared under direction of the Franklin Institute, Philadelphia, Sergeant T. F. Townsend, Signal Corps, assistant:

The weather for September in Pennsylvania has been slightly colder than the average, and has ranged from nearly normal in the western portion to about 3° below in the eastern portion. The mean temperature for the stae was 60°. This, as compared with last September, is between 4° and 5° lower. About the usual differences have occurred between the tide-water sections and the elevated districts.

Rather more than the average amount of cloudiness prevailed.

The rainfall has averaged about three inches as a whole. The greatest rainfall reported was at West Chester, and amounted to 5.67 inches. The heaviest rains occurred on the 11th and 12th, and were quite general throughout the state. Heavy rains were also reported on the 28th and 29th in the eastern counties.

The month has been less stormy than usual, with a small proportion only of windy days. There has been no severe general storm attended with great changes of pressure and profuse rainfall in the eastern counties, as often occurs in September.

The barometer has ranged high, and the monthly mean is above the normal; the mean at Philadelphia being 30.11, Pittsburg, 30.08, and Erie, 30.10.

While light frosts were reported on low lands during the first and middle of the month, vegetation was vigorous and generally uninterrupted until it was suspended by the cold and frost of the 25th and 26th. At this time corn was everywhere fairly ripened, but tobacco, buckwheat, and some vegetables were still growing. These frosts were anticipated by the Chief Signal Officer, and warnings were sent to the tobacco districts.

The wheat seeding season has been favorable, the ground in good condition, and the crop at this date fairly started. The late crop of hay is generally good in the eastern counties. The fruit crops of the state are gathered so

early that they are not subject to risk from frost, except in a few northern districts.

The "South Carolina Weather Service," Hon. A. P. Butler, Commissioner of Agriculture for South Carolina, director:

The prominent meteorological features of the month were the deficiency of the rainfall and the unusually early occurrence of frost.

In regard to the first, the deficiency of rainfall, it may be stated that no rain fell in this state during the period from August 28th to October 15th, and then the showers were light and very badly distributed. At many stations rain fell on only one or two days during the month. The rains of the 23d, 28th, and 29th were quite general, and, though light, they greatly benefited suffering vegetation. At Charleston the rainfall for September, 1887, 1.31 inches, was 4.65 inches less than the average of the last sixteen years, and was the lowest September rainfall recorded since the establishment of the United States signal station in 1871.

The mean temperature for the state was below the average: At Charleston it was 74°.0, against 76°.1, the average for September during the last sixteen years.

The frost which occurred on the 25th, and which was general in the middle and upper divisions of the state, merits special mention, ranking, as it does, with the earliest frost on record in this state. The frost was light, and, owing to the extreme dryness of the atmosphere, no damage, other than the blighting of delicate garden plants, was done to vegetation.

Probably the earliest frost on record in this state was that recorded by Dr. W. W. Anderson, at Stateburg. In examining the records kept by that gentlemen, and kindly placed at our disposal, we find that frost occurred on September 24th and 25th in the year 1856, the temperature at sunrise on the first date being 42°, and on the second 46°. The record states that light frost was observed on both dates. From a record kept by Governor J. H. Hammond, at a plantation near Silver Bluff, S. C., and covering a period of thirty-three years, 1832 to 1864 (See Hand Book of South Carolina), we find the earliest frost recorded October 8th, 1852.

Summary.

Temperature (degrees Fahr.).—Monthly mean, 72°.2; highest monthly mean, 75°.1, at Belfast; lowest monthly mean, 67°.8, at Kirkwood; maximum, 101°, at Chester, on 15th; minimum, 34°, at Kingstree, on the 25th; range for state, 67°; greatest local monthly range, 61°, at Chester and Kingstree; least local monthly range, 41°, at Charleston; greatest daily range, 44°, at Jacksonborough, on the 7th; least daily range, 6°, on the 27th, at Batesburg.

Precipitation, including melted snow (in inches).—Average for the state, 1.12; greatest, 2.69, at Marion; least, 0.12, at Allendale. Average number of rainy days, 3.9.

Wind.—Prevailing direction, east.

The following is an extract from the report of the "Meteorological Department of the State (Tennessee) Board of Health," prepared under direction of J. D. Plunkett, M. D., President of the State Board of Health, by H. C. Bate, Signal Corps, Assistant, Nashville:

The month of September was devoid of any special meteorological features, excepting, perhaps, the abnormally high temperature about the 10–14th. There were but few electrical disturbances, and no very high winds.

The mean temperature was 70°.5, about the September mean of the past five years. The highest temperature was 102°, recorded on the 12th, and was several degrees above the highest recorded in September during the five years past. A maximum of 100° was recorded at several stations during the period of the hot wave which existed during the second decade of the month. The lowest temperature was 34°, recorded on the 25th at two stations, and was below the average September minimum. This cold wave was felt at all the stations on the 24th and 25th, and was followed by the rains of the 26–28th. The highest monthly mean was 77°.4, reported at Austin, and the lowest was 64°.7, reported at Fostoria.

The mean precipitation was 2.70 inches, very nearly the September average of the past five years. Of the amount the eastern division received an average of nearly two and a half inches, the middle division about three inches, and the western division two and a half inches. Until the 17th very little fell in the state, and the proportion of sunshine being very largely above the average, in addition to the high temperature, caused one of the severest droughts known in the history of the state. The rain of the 17–18th was pretty well distributed, and was very welcome, but it was not until the rains of the 26–28th that any material benefit was felt. These rains were, at most points, copious and reviving. The greatest monthly rainfall was 6.84 inches, at Nashville, and was the greatest September rainfall reported at this station during the seventeen years of its establishment, the next greatest being 6.49 inches, in 1881. The least monthly rainfall was 1.34 inches, reported at Greeneville. This was the greatest September minimum during the past five years. The greatest local daily rainfall was 4.00 inches, reported at Fostoria, on the 27th. The next greatest daily fall was 3.12 inches, on the 18th, at Nashville. The rain of the 27th was the heaviest during the month. This was followed by a heavy fall the next day. There were eleven days on which no measurable rainfall was reported. There was very little electrical disturbance with any of the rains during the month.

Summary.

Range of temperature, 68°; mean monthly range of temperature, 53°.7; greatest monthly range of temperature, 64°, at Hohenwald; least monthly range of temperature, 44°, at Careyville and Covington; mean daily range of temperature, 20°; greatest daily range of temperature, 43°, on the 9th, at Riddleton and Lawrenceburg; least daily range of temperature, 2°, on the 17th, at Riddleton, and on the 18th, at Florence Station.

Average number of clear days, 14; average number of fair days, 9; average number of cloudy days, 7; average number of days on which rain fell, 7.

Mean daily rainfall, 0.09 inch; days of greatest daily rainfall, 17th, 18th, 22d, 27th, 28th; day of greatest rainfall, 27th; days without measurable precipitation, 1st, 2d, 5th, 6th, 9th, 13th, 14th, 20th, 21st, 24th, 30th.

Warmest days, 12th, 14th; coldest days, 24th, 25th.

Prevailing winds, east and southeast.

Table of miscellaneous meteorological data for September, 1887—Signal Service observations.

Stations and districts.	Elevation above sea level, feet.	Atmospheric pressure: Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes: Highest barometer.	Date.	Lowest barometer.	Date.	Monthly range of barometer.	Temperature of the air, in degrees Fahrenheit: Monthly mean.	Departure from normal.	Extremes: Max.	Date.	Mean max.	Min.	Date.	Mean min.	Monthly range.	Daily ranges: Greatest.	Date.	Least.	Date.	Mean relative humidity, per cent.	Mean temperature of dew-point, degrees Fahrenheit.	Precipitation, in inches.	Departure from normal precipitation, in inches.	Winds: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles p. h.	Direction.	Date.	No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
New England.										58.8	− 3.3														2.24	− 0.99									
Eastport	53	29.86	−.01	29.92	30.29	12	29.37	7	0.92	54.6	− 1.4	72.0	15	61.5	37.0	26	47.6	35.0	23.4	22	5.3	14	79.0	47.9	1.05	− 2.53	5,324	sw.	27	ne.	24	9	2	14	14
Portland	99	29.94	.00	30.04	30.43	18	29.40	7	1.03	57.1	− 3.9	74.9	6	65.4	36.5	26	48.8	38.4	29.0	21	8.9	13	72.4	47.7	0.70	− 2.34	4,798	nw.	27	sw.	7	6	4	16	10
Manchester	......	29.82	.....	......	......	..	......	..	....	56.4	− 5.9	80.4	7	67.7	32.2	26	45.1	48.2	39.3	21	7.1	25	81.0	50.0	0.94	....	3,295	n.	24	nw.	3	8	4	15	11
Mt. Washington	6,279	23.84	−.04	30.07	30.50	17	29.39	7	1.11	36.1	− 5.9	56.0	6	42.2	17.5	23	29.8	38.5	21.1	22	6.2	2	86.7	31.8	4.03	− 4.63	21,575	nw.	82	sw.	7	11	1	13	16
Northfield	871	29.13	.....	30.07	30.45	11	29.38	7	1.07	52.6	......	78.7	14	63.6	29.2	27	39.9	49.5	43.2	21	8.8	3	81.3	46.2	1.78	....	5,473	s.	30	s.	7	11	7	12	11
Boston	124	29.95	+.01	30.08	30.46	18	29.48	7	0.98	59.6	− 3.4	80.3	7	67.7	40.3	24	51.9	40.0	27.8	21	5.8	30	73.4	50.5	0.97	− 1.99	7,319	w.	30	sw.	7	7	5	11	14
Edgartown	......	......	.....	......	......	..	......	..	....	61.8	......	74.8	5	67.6	40.9	26	56.0	33.9	20.5	18	3.2	30	....	....	1.45	....	......	sw.	...	....	..	6	..	..	..
Nantucket	14	30.08	.....	30.08	30.44	18	29.61	7	0.83	60.5	− 2.2	72.0	5	65.2	47.3	27	55.4	24.7	16.7	18	3.7	30	78.4	53.3	1.99	....	6,766	w.	32	ne.	24	10	9	11	10
Wood's Holl	......	30.10	.....	30.11	30.48	18	29.61	7	0.87	60.3	......	74.6	5	65.8	48.7	25	56.2	25.9	17.7	13	4.2	29	84.1	55.2	1.99	....	10,122	sw.	...	....	..	8	9	10	11
Block Island	27	30.06	+.01	30.08	30.45	18	29.57	7	0.88	61.5	− 2.5	74.0	5	66.5	47.0	24	56.6	27.0	15.1	18	3.5	30	82.6	55.9	2.00	− 1.07	9,193	sw.	36	sw.	7	6	8	13	9
Narragansett Pier	......	......	.....	......	......	..	......	..	....	60.2	......	75.0	5	68.3	35.0	27	52.0	40.0	....	..	....	..	....	....	3.14	+ 0.59	......	......	...	....	..	9	..	..	..
New Haven	107	29.99	+.03	30.09	30.46	18	29.53	7	0.93	59.7	− 4.3	77.7	15	67.8	35.8	27	51.0	41.9	34.6	4	5.4	12	76.0	51.6	2.21	− 1.37	4,805	sw.	25	n.	24	8	12	6	12
New London	47	30.03	−.01	30.07	30.42	18	29.55	7	0.87	61.2	− 2.8	77.0	15	68.6	38.4	27	53.7	38.6	23.4	27	4.3	29	77.3	53.5	2.32	− 1.46	3,709	sw.	26	sw.	7	8	11	12	7
Mid. Atlantic States.										64.4	− 4.4														3.05	− 0.68									
Albany	85	30.02	+.03	30.10	30.47	17	29.46	7	1.01	59.3	− 5.7	82.0	7	68.9	37.7	24	50.3	44.3	30.0	18	8.1	2	75.8	51.0	1.94	− 1.35	3,636	s.	24	s.	7	12	8	15	7
New York City	158	29.92	.00	30.11	30.46	18	29.54	7	0.92	63.1	− 3.9	84.4	7	69.9	41.3	25	56.3	43.1	21.0	4	4.0	30	69.0	51.9	2.30	− 1.04	5,271	nw.	30	sw.	7	11	9	8	13
Philadelphia	117	30.00	+.03	30.11	30.46	18	29.60	7	0.86	64.0	− 5.0	85.7	7	72.1	42.4	25	57.4	43.3	23.8	4	3.5	28	69.7	52.8	4.92	+ 1.73	6,048	n.	36	sw.	7	12	12	9	9
Atlantic City	13	30.12	+.05	30.12	30.45	18	29.65	7	0.80	63.4	− 4.6	78.4	10	69.8	40.5	25	57.4	37.9	20.9	5	4.1	28	87.0	59.2	3.12	− 0.03	5,369	sw.	21	ne.	11	13	7	11	12
Baltimore	45	30.08	+.03	30.11	30.43	17	29.62	7	0.81	64.7	− 5.3	87.9	7	73.0	42.2	25	57.4	45.7	26.3	2	7.8	13	70.0	53.7	2.80	− 0.93	3,184	n.	20	n.	22	10	8	14	8
Washington City	106	30.02	+.03	30.12	30.42	17	29.66	7	0.76	65.0	− 4.0	89.6	7	74.3	40.0	26	56.7	49.6	26.5	5	9.0	28	72.9	55.0	3.12	− 0.73	3,057	s.	24	n.	22	12	8	14	8
Cape Henry	16	......	.....	......	......	..	......	..	....	69.1	......	88.0	8	75.5	49.0	27	62.7	38.0	26.0	23	6.5	14	....	....	3.07	− 1.92	......	e.	...	....	..	5	..	..	..
Lynchburg	652	29.44	+.03	30.11	30.41	17	29.74	7	0.67	66.7	− 4.3	96.9	14	78.2	36.8	25	56.8	60.1	34.7	10	7.1	28	75.5	57.4	3.11	− 0.11	1,677	ne.	15	ne.	14	9	10	11	9
Norfolk	30	30.09	+.03	30.10	30.37	18	29.80	23	0.66	69.3	− 2.7	91.4	13	77.6	46.0	25	61.3	45.4	24.5	7	6.5	15	77.9	61.6	3.06	− 1.70	4,687	ne.	24	n.	23	7	6	16	8
South Atlantic States.										72.1	− 3.0														1.78	− 3.69									
Charlotte	808	29.28	+.03	30.10	30.36	18	29.77	23	0.59	70.1	− 1.9	93.9	14	81.0	39.5	25	59.6	54.4	34.7	7	10.3	29	70.3	58.8	1.24	− 1.70	3,408	sw.	20	ne.	15	5	5	17	8
Hatteras	11	30.13	+.06	30.12	30.33	18	29.73	23	0.60	70.9	− 4.1	84.4	14	76.3	53.3	25	66.2	31.1	16.8	27	4.8	15	77.1	63.3	0.80	− 6.29	8,458	ne.	46	n.	23	3	2	9	19
Raleigh	439	29.72	.....	......	......	..	......	..	....	67.3	− 5.0	92.1	14	77.1	40.2	25	59.3	51.9	25.5	3	10.0	8	81.8	61.1	2.17	....	2,443	sw.	21	ne.	23	6	5	11	14
Southport	34	......	.....	......	......	..	......	..	....	71.0	......	86.0	14	78.3	39.5	25	63.7	46.5	23.5	25	8.7	9	....	....	1.28	− 4.69	......	e.	...	....	..	9	..	..	..
Wilmington	52	30.05	+.01	30.08	30.27	18	29.70	23	0.57	71.2	− 2.8	91.0	14	79.8	42.3	25	61.9	48.7	23.3	10	11.0	28	77.8	63.6	0.46	− 6.78	4,371	sw.	18	ne.	1	7	3	15	12
Charleston	52	30.06	+.05	30.08	30.24	18	29.74	23	0.50	74.0	− 3.0	90.1	15	80.5	49.2	25	67.6	40.9	16.8	15	6.9	9	76.9	65.9	1.31	− 5.01	6,681	ne.	30	e.	19	9	2	7	21
Columbia	......	......	.....	......	......	..	......	..	....	72.0	......	96.2	15	82.2	42.8	25	62.6	53.4	29.0	4	12.0	19	73.8	62.6	0.56	....	......	......	...	....	23	5	3	14	13
Augusta	183	29.92	+.01	30.08	30.27	18	29.76	23	0.51	73.8	− 1.2	98.2	15	85.4	44.9	25	64.0	53.3	30.9	3	9.5	19	68.9	61.8	0.81	− 2.89	2,658	ne.	22	n.	24	4	6	10	14
Savannah	87	30.01	+.03	30.07	30.22	20	29.82	23	0.40	73.3	− 3.7	93.1	8	82.0	50.0	25	66.3	43.1	24.4	8	7.7	17	81.8	67.0	1.97	− 3.47	5,399	e.	30	e.	17	7	5	11	14
Jacksonville	43	30.02	+.01	30.03	30.16	20	29.82	23	0.34	76.0	− 2.0	95.1	9	84.2	55.3	25	68.9	39.8	25.8	8	6.6	17	80.5	69.2	9.40	+ 1.61	5,715	ne.	24	ne.	5	13	5	14	11
Florida Peninsula.										79.5	− 2.0														4.20	− 1.55									
Cedar Keys	22	30.00	−.01	29.98	30.09	11	29.81	27	0.28	77.6	− 2.4	90.6	16	84.6	62.2	25	71.0	28.4	20.6	6	7.5	19	76.3	69.1	1.11	− 3.85	7,176	ne.	30	se.	27	10	5	11	14
Key West	22	29.97	−.01	29.94	30.05	10	29.72	2	0.33	81.4	− 1.6	88.1	28	86.0	71.8	16	76.3	16.3	15.4	14	5.4	25	77.0	73.2	7.30	+ 0.75	7,234	e.	42	ne.	2	15	9	16	5
Titusville	25	30.03	.....	30.00	30.11	11	29.84	7	0.27	77.8	......	91.7	9	82.3	64.0	23	72.6	27.7	22.6	9	3.8	5	80.5	71.0	6.32	....	8,912	e.	40	ne.	16	18	8	10	12
Eastern Gulf States.										75.9	− 0.1														4.36	+ 0.35									
Atlanta	1,129	28.93	.00	30.07	30.27	20	29.76	27	0.51	72.1	+ 0.1	95.1	15	80.6	44.8	25	61.8	50.3	25.0	9	9.0	19	61.8	56.9	4.20	+ 1.27	6,150	e.	25	se.	27	8	4	12	14
Pensacola	30	30.00	.00	29.98	30.08	12	29.60	27	0.48	77.6	− 0.4	93.6	8	84.2	58.8	30	71.1	34.8	19.3	8	4.1	19	73.6	68.1	4.64	− 1.14	6,073	e.	36	s.	27	6	6	8	16
Mobile	35	30.00	.00	30.00	30.11	5	29.62	27	0.49	77.0	0.0	96.2	10	85.5	53.2	2	68.8	43.0	25.8	2	5.7	18	74.2	67.4	6.21	+ 1.07	5,064	sw.	43	w.	27	6	4	14	12
Montgomery	219	29.83	.00	30.03	30.16	21	29.59	27	0.57	75.7	− 0.3	98.8	15	85.8	50.0	25	65.4	48.8	27.1	16	8.0	18	64.7	61.7	2.03	− 0.77	3,676	e.	23	e.	16	4	6	6	18
Vicksburg	222	29.80	−.02	30.00	30.16	24	29.60	27	0.56	75.9	+ 0.9	96.3	15	86.5	52.2	25	67.1	44.1	26.2	25	10.7	29	72.8	65.6	4.55	+ 0.03	3,520	se.	28	se.	15	7	2	13	15
Oxford	......	......	.....	......	......	..	......	..	....	75.9	......	99.0	10	87.1	50.2	24	65.4	48.8	29.4	9	9.4	27	64.7	61.9	3.60	....	......	......	...	....	..	4	6	10	14
New Orleans	52	29.96	.00	29.98	30.09	30	29.56	27	0.53	77.3	− 0.7	94.0	16	84.9	60.1	29	71.7	33.9	18.0	16	5.5	20	76.8	68.6	6.51	+ 1.65	5,657	e.	38	ne.	20	7	5	7	18
Western Gulf States.										76.8	+ 0.4														2.48	− 2.17									
Shreveport	227	29.78	−.02	29.98	30.15	24	29.69	27	0.46	77.2	+ 1.2	100.0	10	89.8	53.8	28	67.5	46.2	31.0	30	9.4	26	70.8	66.0	3.64	− 0.79	3,194	s.	24	e.	15	7	2	10	18
Fort Smith	500	29.51	−.02	29.99	30.20	24	29.70	27	0.50	73.6	+ 0.3	96.9	9	84.6	45.0	30	64.2	51.9	34.7	30	6.1	28	72.1	62.7	3.74	+ 0.06	2,863	se.	18	sw.	12	10	5	10	15
Little Rock	309	29.70	−.02	29.99	30.22	24	29.65	27	0.57	74.9	+ 1.9	97.0	9	85.0	50.1	24	65.8	46.9	28.8	2	6.8	27	64.0	60.2	1.04	− 2.37	3,433	ne.	20	ne.	23	5	4	11	15
Corpus Christi	18	29.96	.....	29.94	30.08	29	29.68	26	0.40	79.4	− 0.3	88.2	18	83.5	59.0	29	73.1	29.2	20.0	29	4.6	6	79.1	72.0	9.24	....	9,096	e.	45	ne.	21	19	7	12	11
Galveston	40	29.97	.00	29.97	30.09	5	29.69	27	0.40	79.7	− 0.3	88.4	9	84.7	57.2	28	74.3	31.2	18.3	28	5.9	24	73.0	69.8	2.52	− 5.40	8,046	se.	40	ne.	20	10	6	8	16
Palestine	533	29.48	−.01	30.00	30.11	24	29.77	26	0.34	75.2	− 0.8	92.4	11	85.4	50.4	30	66.3	42.0	34.2	30	6.4	20	72.8	64.9	2.20	− 1.80	5,448	s.	26	nw.	27	7	4	9	17
San Antonio	781	29.19	+.01	29.96	30.07	15	29.64	26	0.43	77.5	+ 0.5	94.3	10	87.0	50.4	29	69.5	43.9	32.0	29	5.4	26	72.0	66.7	1.77	− 2.72	5,953	se.	28	se.	26	6	10	11	9
Rio Grande Valley.										79.1	− 1.0														10.27	+ 4.43									
Brownsville	57	29.89	−.01	29.90	30.10	29	28.94	21	1.16	77.9	− 1.1	90.1	6	86.3	62.9	29	73.1	27.2	19.5	29	6.0	20	86.7	73.3	13.65	+ 5.76	5,037	e.	78	nw.	21	15	3	15	12
Rio Grande City	230	29.77	+.02	29.96	30.16	29	29.61	22	0.55	80.2	− 0.8	96.7	11	91.0	61.1	28	73.0	35.6	24.0	30	6.3	21	74.5	70.1	6.89	+ 3.10	4,619	s.	33	se.	22	12	4	11	15
Ohio Val. & Tenn.										69.2	− 0.2														2.72	− 0.22									
Chattanooga	783	29.29	+.01	30.08	30.29	20	29.73	27	0.56	71.0	0.0	95.0	14	83.2	40.6	25	60.6	54.4	34.1	9	10.3	27	65.2	57.0	3.60	− 0.16	3,371	se.	23	se.	27	9	6	12	12
Knoxville	980	29.09	.00	30.10	30.34	20	29.77	28	0.57	69.9	− 0.1	94.0	14	81.1	37.8	25	58.2	56.2	31.2	10	7.4	27	67.0	56.9	1.63	− 1.18	3,425	sw.	32	nw.	7	7	5	10	15
Memphis	320	29.70	−.02	30.01	30.21	24	29.60	27	0.61	73.8	+ 0.8	98.7	10	84.8	49.2	24	64.8	49.5	32.3	9	6.8	27	66.9	60.6	2.15	− 1.10	3,909	w.	23	n.	23	9	6	14	10
Nashville	549	29.46	−.03	30.02	30.27	20	29.61	27	0.66	72.3	+ 1.3	99.0	10	83.0	43.9	25	61.6	55.1	41.9	9	5.5	18	62.0	56.4	6.85	+ 3.35	3,360	e.	24	w.	7	10	6	15	9
Louisville	551	29.50	+.01	30.06	30.33	20	29.75	27	0.58	70.8	+ 0.8	94.5	9	80.4	42.3	24	60.6	52.2	41.4	9	6.6	27	57.1	52.8	2.84	− 0.06	4,677	n.	24	w.	7	12	7	16	7
Indianapolis	766	29.28	+.02	30.08	30.37	16	29.78	27	0.59	65.8	− 1.2	93.1	6	76.0	34.0	24	55.7	59.1	33.4	9	6.2	28	65.1	51.7	2.11	− 0.62	3,476	e.	20	sw.	13	12	8	16	6
Terre Haute	......	......	.....	......	......	..	......	..	....	66.9	......	92.8	6	77.0	33.6	24	56.8	59.2	37.0	9	6.9	28	....	....	2.58	....	......	e.	...	....	..	9	..	..	..
Cincinnati	628	29.43	+.02	30.08	30.35	20	29.75	7	0.60	68.2	− 0.8	93.0	13	78.0	40.2	24	58.3	52.8	37.6	9	6.7	18	53.8	50.8	1.93	− 0.33	4,611	se.	25	nw.	7	12	11	12	7
Columbus	812	29.24	+.02	30.08	30.40	20	29.67	7	0.73	66.0	− 1.0	92.9	13	75.7	35.7	24	52.8	57.2	39.7	5	8.2	7	62.8	51.5	1.35	− 1.29	4,484	n.	30	w.	7	10	8	16	6
Pittsburg	847	29.20	+.01	30.08	30.39	20	29.61	7	0.78	65.1	− 1.9	91.5	13	74.3	36.3	26	54.8	55.2	33.3	5	9.0	28	63.7	51.2	2.03	− 0.57	3,854	n.	20	sw.	6	14	8	18	4
Lower lake region.										60.1	− 4.0														2.75	− 0.38									
Buffalo	690	29.37	+.05	30.11	30.47	20	29.55	7	0.92	58.9	− 4.1	79.2	13	66.8	36.5	25	51.2	42.7	27.3	17	9.3	24	69.5	48.3	2.30	− 1.04	5,694	sw.	36	w.	7	12	10	9	11
Oswego	335	29.72	+.03	30.08	30.47	20	29.48	7	0.99	58.2	− 3.8	78.9	21	66.4	40.3	17	50.6	38.6	31.4	21	7.3	24	70.1	47.9	1.91	− 0.75	7,076	se.	30	nw.	7	11	11	14	5
Rochester	621	29.43	+.04	30.09	30.46	20	29.50	7	0.97	58.7	− 4.3	87.4	13	67.9	34.2	26	49.2	53.2	28.8	1	9.4	24	69.4	47.6	0.90	− 1.47	6,991	sw.	36	nw.	7	12	11	9	10
Erie	681	29.38	+.04	30.10	30.42	20	29.59	7	0.83	60.0	− 4.0	92.0	13	69.7	37.5	26	51.6	54.5	32.0	13	9.3	29	76.5	52.3	3.17	− 1.01	5,701	s.	29	w.	7	14	12	12	6
Cleveland	690	29.37	+.03	30.10	30.40	20	29.66	7	0.74	61.6	− 3.4	93.0	13	70.2	36.1	26	52.4	56.9	32.1	5	7.4	27	71.2	51.3	3.62	− 0.17	5,318	se.	28	sw.	6	12	12	12	6
Sandusky	638	29.44	+.00	30.11	30.41	20	29.70	7	0.71	62.8	− 3.2	95.0	13	71.7	42.0	26	55.2	53.0	31.0	5	5.9	24	72.5	53.1	2.31	− 1.05	7,660	ne.	43	n.	23	12	8	12	10
Toledo a	651	29.42	+.06	30.12	30.43	16	29.71	6	0.72	60.8	− 4.2	92.9	13	71.1	34.2	24	52.7	58.7	31.6	5	6.8	29	72.7	51.2	3.37	+ 0.70	4,975	ne.	30	ne.	28	12	10	9	10
Detroit	662	29.41	+.06	30.11	30.44	16	29.65	7	0.79	60.0	− 5.0	90.5	13	68.6	33.8	24	51.5	66.7	29.8	18	6.1	30	73.4	50.8	4.41	+ 1.71	5,800	ne.	30	nw.	7	8	13	8	9
Upper lake region.										57.3	− 2.2														2.69	− 0.99									
Alpena	609	29.44	+.08	30.10	30.49	16	29.48	6	1.01	53.8	− 3.2	82.3	13	62.9	28.3	24	44.1	54.0	28.3	28	7.5	30	75.7	45.8	2.14	− 2.50	5,817	w.	42	w.	7	9	6	13	11
Escanaba	608	29.42	+.09	30.08	30.50	16	29.50	6	1.00	54.6	− 2.4	79.5	6	62.7	29.1	24	45.5	50.4	25.5	8	3.7	30	73.1	45.2	1.13	− 3.07	5,829	n.	30	w.	7	6	5	12	13
Grand Haven	620	29.42	+.06	30.09	30.49	16	29.59	6	0.90	58.5	− 3.5	82.1	6	67.4	31.9	24	50.7	50.2	29.7	19	6.0	30	75.9	50.3	4.71	+ 0.68	6,334	e.	33	nw.	7	13	10	9	11
Lansing	870	29.18	.....	30.09	30.44	16	29.65	6	0.79	59.5	− 5.8	86.1	5	69.2	33.8	24	50.7	52.3	28.7	18	7.0	2	83.4	54.1	5.21	....	4,083	ne.	28	sw.	13	11	5	17	8
Mackinaw City	605	29.44	+.07	30.11	30.52	16	29.46	6	1.06	54.1	− 1.2	75.5	6	61.7	32.3	24	47.7	43.2	23.6	18	3.2	30	72.8	45.3	1.65	− 0.56	7,765	se.	39	w.	6	9	4	14	12
Marquette	672	29.35	+.09	30.09	30.50	16	29.50	13	1.00	54.3	− 1.7	82.0	6	62.5	32.8	24	45.6	49.2	28.4	8	6.4	30	72.5	45.0	1.06	− 3.70	6,212	nw.	40	nw.	6	7	5	17	8
Port Huron	639	29.41	+.05	30.10	30.43	20	29.63	7	0.80	59.2	− 2.8	89.0	13	67.8	34.0	26	49.1	55.0	29.7	5	4.2	2	74.2	50.5	2.48	− 0.14	6,822	n.	50	sw.	9	12	11	11	8
Chicago	715	29.31	+.03	30.06	30.42	16	29.69	6	0.73	62.5	− 2.5	90.0	6	70.1	41.0	23	54.5	49.0	28.0	6	7.0	11	71.8	52.1	4.03	+ 0.98	7,849	e.	36	e.	27	15	12	11	7
Green Bay	616	29.42	.....	30.09	30.50	16	29.63	6	0.87	57.8	− 0.5	81.9	6	65.9	31.0	24	49.2	50.9	33.7	18	7.7	30	77.3	49.9	3.29	....	5,318	sw.	30	w.	6	14	11	12	7
Milwaukee	697	29.33	+.06	30.06	30.46	16	29.63	6	0.83	60.4	− 0.6	85.9	6	67.8	37.8	24	53.6	48.1	22.1	14	6.0	10	74.9	51.9	4.36	+ 1.27	7,609	se.	33	e.	27	13	12	11	7
Duluth	672	29.33	+.10	30.07	30.44	15	29.54	12	0.90	55.4	+ 0.4	86.2	6	63.4	36.1	23	48.7	50.1	33.4	20	3.3	4	74.1	46.6	2.68	− 1.85	5,111	ne.	35	sw.	13	10	5	16	9
Extreme northwest.										56.3	+ 2.5														0.84	− 0.50									
Moorhead	926	29.01	+.07	30.02	30.47	15	29.41	12	1.06	56.1	+ 1.1	84.0	19	68.6	23.0	23	44.4	61.0	40.0	29	11.0	2	71.2	45.6	0.30	− 2.12	7,900	s.	48	se.	12	5	6	13	11
Saint Vincent	804	29.13	+.07	30.02	30.48	15	29.31	12	1.17	54.8	+ 2.8	85.4	19	68.4	18.5	23	39.6	66.9	51.8	29	15.3	3	77.7	47.3	0.45	− 1.68	6,400	s.	48	s.	19	4	4	13	13
Bismarck	1,694	28.22	+.08	30.02	30.47	15	29.48	12	0.99	57.5	+ 1.5	85.3	16	69.7	28.0	23	45.5	57.3	39.6	28	13.0	6	69.6	46.5	1.35	+ 0.11	5,992	se.	36	nw.	12	5	2	16	12
Fort Buford	1,854	27.96	+.03	29.92	30.38	22	29.46	12	0.92	58.2	+ 4.2	86.7	16	71.9	31.0	21	46.1	57.7	39.3	16	9.6	1	62.3	43.8	1.07	+ 0.38	6,169	nw.	35	nw.	12	4	4	16	10
Fort Totten	1,487	28.41	.....	30.03	30.52	15	29.40	12	1.12	55.1	+ 3.1	81.4	19	66.6	25.5	15	43.6	55.9	39.3	28	8.1	2	71.4	44.9	0.59	− 0.18	10,906	s.	50	w.	13	5	3	15	12
Fort Yates	......	......	.....	......	......	..	......	..	....	61.1	......	90.0	10	74.8	30.0	23	47.4	60.0	47.0	21	4.0	12	....	....	1.31	+ 0.49	......	se.	...	....	..	3	..	..	..

Table of miscellaneous meteorological data for September, 1887—Signal Service observations—Continued.

Stations and districts.	Elevation above sea-level, feet.	Atmospheric pressure, in inches and hundredths.								Temperature of the air, in degrees Fahrenheit.												Mean relative humidity, per cent.	Mean temperature of dew-point, Fahrenheit.	Precipitation, in inches.		Winds.					
		Mean actual barometer.	Departure from normal.	Mean reduced barometer.	Extremes.				Monthly range of barometer.	Monthly mean.	Departure from normal.	Extremes.				Monthly range.	Daily ranges.								Total movement, miles.	Prevailing direction.	Maximum velocity.		No. of rainy days.	No. of cloudy days.	No. of fair days.	No. of clear days.
					Highest barometer.	Date.	Lowest barometer.	Date.				Max.	Date.	Mean max.	Min.	Date.	Mean min.		Greatest.	Date.	Least.	Date.					Miles p. h.	Direction.	Date.			
Upper Miss. Valley.																															
Saint Paul	831	29.16	+.08	30.06	30.44	15	29.53	12	0.91	64.4	— 0.9	83.2	6	67.3	33.5	23	49.5	49.7	27.4	16	6.3	3	78.7	50.7	4.14	+ 0.35						
La Crosse	744	29.30	+.10	30.10	30.49	16	29.60	12	0.89	57.8	— 2.2	85.0	6	68.4	33.5	24	50.7	51.5	32.0	18	7.2	30	77.1	50.9	4.35	+ 0.97	3,908	se.	25	5	11	10	13	7
Davenport	615	29.39	—.03	30.04	30.45	16	29.70	12	0.75	59.0	— 3.0	85.0	6	68.4	33.5	24	50.7	51.5	32.0	18	7.2	30	77.1	50.9	4.35	+ 0.61	4,595	s.	36	5	16	11	10	9
Des Moines	866	29.14	—.05	30.04	30.41	15	29.58	12	0.83	64.4	— 0.6	93.2	6	75.0	42.1	24	55.7	51.1	33.1	12	7.6	27	69.0	52.7	5.45	+ 2.16	5,318	sw.	25	nw.	21	13	9	13	8
Dubuque	665	29.36	—.06	30.07	30.44	16	29.66	12	0.78	63.8	— 0.2	92.3	12	74.0	38.1	23	54.6	54.2	36.5	18	3.7	27	70.7	52.8	5.36	+ 1.46	3,614	s.	34	sw.	12	11	8	13	9
Keokuk	618	29.39	+.03	30.03	30.35	15	29.71	12	0.64	61.8	— 1.2	87.6	6	71.5	37.7	24	53.5	49.9	33.8	18	7.3	3	75.6	53.5	7.62	+ 2.88	3,211	se.	20	ne.	28	13	11	8	11
Cairo	359	29.68	—.01	30.04	30.28	24	29.64	27	0.64	65.9	— 1.1	95.7	6	77.3	36.2	24	57.2	59.5	31.8	17	3.5	27	64.7	51.6	3.13	— 0.54	5,933	s.	35	s.	12	11	8	7	15
Springfield	644	29.40	+.03	30.07	30.40	16	29.74	27	0.66	71.1	+ 1.1	94.6	12	80.4	44.0	24	62.8	50.6	32.3	9	5.7	27	68.1	58.5	1.67	— 1.04	4,861	s.	33	n.	23	10	12	10	8
Saint Louis	571	29.45	+.01	30.04	30.34	16	29.68	27	0.66	65.9	— 1.1	96.0	9	76.4	36.8	24	56.1	59.2	36.7	9	6.4	27	69.0	53.8	2.89	— 1.02	5,372	s.	30	nw.	7	8	10	10	10
Missouri Valley.										70.0	0.0	97.4	9	79.0	44.8	24	61.1	52.6	32.4	9	6.4	27	60.9	53.9	2.47	— 1.14	5,554	s.	30	nw.	13	8	6	13	11
Forest Park		29.50								63.7	+ 1.1														2.96	— 0.51						
Lamar	1,028	28.99		30.04	30.32	24	29.78	26	0.54	67.2		96.1	9	78.7	30.1	24	53.8	66.0	43.1	9	4.8	27	75.8	58.3	2.49		2,265	s.	21	nw.	22	6	6	13	11
Leavenworth	842	29.17	+.04	30.04	30.35	16	29.68	12	0.67	68.0	— 1.3	92.6	9	78.3	43.2	24	60.1	49.4	31.2	8	4.0	29	78.9	60.2	4.01	— 5.59	5,139	sw.	30	n.	9	10	9	14	7
Topeka										66.7	— 1.3	94.7	12	77.5	43.0	24	57.8	51.7	34.2	8	5.2	28	74.3	57.2	5.73	+ 2.23	4,468	n.	27	s.	12	12	7	14	9
Omaha		28.90	+.06	30.07	30.42	15	29.57	12	0.85	67.1		96.7	12	79.2	41.0	24	57.6	55.7	38.9	8	2.8	28	80.7	60.1	4.67						11	8	11	11
Crete										65.3	+ 0.3	92.1	12	75.7	38.9	23	56.4	53.2	32.3	13	10.2	13	68.8	53.6	2.44	— 1.14	5,848	s.	36	s.	12	8	7	15	8
Valentine	2,614	27.34		30.01	30.46	15	29.52	12	0.94	64.8		94.3	12	76.1	36.7	23	55.1	57.6	32.9	14	7.6	10	79.2	54.9	2.28						9	10	13	7	
Fort Sully		28.31		30.00	30.43	15	29.49	8	0.94	61.6	+ 1.3	93.2	8	74.0	31.7	26	50.3	61.5	36.8	30	10.5	22	63.5	47.2	1.36	— 0.34	8,503	s.	48	nw.	12	6	7	9	14
Huron	1,307	28.65	+.08	30.04	30.48	15	29.50	12	0.98	62.7	+ 7.0	93.7	8	76.0	34.8	23	50.8	58.9	38.4	22	11.7	1	62.1	47.2	0.35	— 0.77	7,803	e.	42	w.	12	4	4	12	13
Yankton	1,234	28.71	+.04	30.01	30.40	23	29.47	12	0.93	59.6	+ 1.6	89.1	8	73.0	25.7	23	48.7	63.4	40.2	25	14.0	27	67.1	47.4	0.15	— 1.70	7,984	se.	42	se.	12	2	3	17	10
Northern slope.										62.0	0.0	90.6	8	74.2	35.3	23	52.9	55.3	32.2	8	7.1	11	80.3	55.3	6.70	+ 3.77	3,890	n.	30	e.	4	11	8	11	11
Fort Assiniboine	3,690	27.17	+.02	29.98	30.38	22	29.58	18	0.80	57.8	+ 2.4														2.12	+ 1.10						
Fort Custer	3,040	26.85	+.02	29.96	30.39	22	29.58	7	0.81	56.2	+ 2.2	83.6	29	69.7	33.1	22	45.0	50.5	40.7	16	10.5	11	61.4	41.3	1.14	— 0.17	6,868	sw.	43	sw.	16	6	5	12	13
Fort Maginnis	4,320	25.61	+.03	29.98	30.41	22	29.59	18	0.82	60.3	+ 3.3	87.0	7	74.0	33.5	22	44.5	53.5	42.4	24	17.3	14	54.8	41.3	1.13	+ 0.40	4,635	se.	37	nw.	11	5	2	11	17
Helena	4,069	25.86	+.01	29.98	30.30	22	29.61	18	0.69	53.5	+ 1.5	84.9	7	68.3	28.2	22	43.0	56.7	38.8	15	11.6	12	71.3	43.7	5.15	+ 4.36	7,145	nw.	57	nw.	8	6	3	13	14
Poplar River	2,002	27.86		29.97	30.47	22	29.60	7	0.87	56.0	+ 1.0	81.1	29	69.1	31.8	22	43.8	49.3	40.7	23	5.2	4	48.8	35.3	0.50	— 1.16	4,886	sw.	30	sw.	13	5	3	8	19
Deadwood	4,600	25.45	+.05	30.04	30.42	14	29.62	12	0.80	57.8	+ 4.8	89.0	16	72.0	26.8	21	42.3	62.2	47.6	16	13.4	1	71.1	47.6	0.90	+ 0.34	4,776	w.	44	nw.	12	9	3	11	16
Cheyenne	6,105	24.11	+.04	30.00	30.35	27	29.59	12	0.76	56.7	+ 2.7	80.0	18	68.3	33.3	27	47.0	46.7	35.0	18	8.1	22	78.5	49.7	1.75	+ 0.91	3,740	w.	24	sw.	4	9	4	11	15
Fort Laramie										58.6	+ 2.6	86.0	5	72.8	32.7	27	45.6	53.3	36.8	18	14.3	20	46.0	33.5	1.25	+ 0.36	7,337	nw.	45	nw.	12	7	5	10	15
North Platte	2,841	27.14	+.06	30.04	30.44	15	29.63	12	0.81	61.8		87.0	8	77.3	30.0	27	46.2	57.0	32.8	30	14.8	9			1.05			e.			3			
Middle slope.										62.9	+ 0.9	94.0	6	75.4	30.3	28	52.9	63.7	36.5	29	10.7	23	74.1	53.7	5.10	+ 3.76	6,785	se.	34	n.	26	9	4	14	12
Colorado Springs										66.8	+ 1.1														2.12	+ 0.10						
Denver	5,294	24.83	+.04	29.96	30.29	15	29.62	3	0.67	61.1		84.0	5	74.0	36.2	28	49.0	47.8	38.0	30	11.7	23	57.8	44.0	0.80						6	4	12	14
Pike's Peak	14,134	18.01		30.02	30.32	27	29.67	12	0.65	63.1	+ 1.1	87.6	8	77.1	35.0	28	49.5	52.6	40.0	30	12.6	22	60.0	47.3	0.97	+ 0.05	4,990	s.	42	w.	12	9	3	15	12
Las Animas	3,899	26.09	+.03	29.93	30.25	15	29.54	12	0.71	53.4		81.3	23	41.2	15.4	27	28.4	35.9	18.7	23	6.9	26	77.4	26.5	1.80	+ 0.03	12,892	w.	60	w.	13	12	5	16	9
Concordia	1,384	28.58		30.02	30.35	23	29.58	12	0.77	66.9	+ 1.9	95.0	5	81.5	33.8	28	53.0	61.2	42.7	30	16.0	9	57.2	48.5	0.63	— 0.10	4,599	e.	36	n.	25	6	4	9	17
Dodge City	2,523	27.44	+.03	30.02	30.34	15	29.62	12	0.72	66.4	— 0.1	94.1	12	77.0	40.0	30	57.7	54.1	33.8	30	3.7	27	70.9	55.5	3.62	— 0.09	5,903	s.	36	n.	7	7	6	11	13
Fort Reno										68.2	+ 1.2	96.5	12	80.6	38.3	29	57.5	58.2	40.5	30	13.9	10	67.0	55.0	0.14	— 1.23	7,825	se.	48	sw.	12	3	3	10	17
Fort Supply										70.6		96.5	3	79.4	44.5	30	61.9	52.0							5.43	+ 2.59					13			
Fort Elliott	2,700	27.30	+.03	29.95	30.21	15	29.68	12	0.53	77.8		94.3	5	82.6	42.4	30	62.9	51.9	34.9	30	10.1	17			2.30	+ 0.03		s.			8			
Southern slope.										69.5	+ 1.5	95.4	12	80.4	38.7	29	58.5	56.7	37.1	30	10.5	17	68.9	57.3	1.67	— 0.56	8,207	s.	46	nw.	27	8	5	14	11
Fort Sill	1,200	28.79	+.01	30.00	30.22	15	29.80	26	0.42	72.1	+ 2.1														4.78	+ 1.70						
Abilene	1,748	28.21		29.96	30.13	15	29.73	16	0.40	73.0		96.0	9	82.8	48.2	29	64.4	47.8	29.1	30	6.0	16	71.5	62.2	5.19	+ 2.47	7,028	s.	36	nw.	27	11	5	13	12
Fort Davis	4,928	25.25	.00	29.98	30.13	15	29.85	12	0.28	75.9	+ 2.9	92.8	11	84.5	48.5	28	67.2	44.3	27.9	29	7.1	26	67.7	63.3	2.64	— 1.53	7,089	s.	36	nw.	27	6	4	15	11
Fort Stanton	6,150	24.07		29.90	30.08	15	29.72	25	0.36	68.3	+ 1.3	85.9	11	77.1	47.9	28	60.9	38.0	30.6	30	9.0	24	65.5	55.4	7.08	+ 4.59	3,865	ne.	24	ne.	13	15	7	14	9
Southern plateau.										60.1		79.0	6	72.8	40.0	29	50.8	39.0	34.5	30	11.3	15	75.9	51.8	4.21	+ 1.26	2,538	se.	24	sw.	11	17	2	12	16
El Paso	3,764	26.28	+.01	29.92	30.06	27	29.78	8	0.28	70.4	+ 2.3														2.58	+ 1.44						
Lava										74.2	+ 2.2	92.0	30	86.6	51.9	29	64.1	40.1	36.0	30	17.0	27	67.5	62.0	0.94	— 0.27	2,404	e.	22	se.	25	7	1	13	16
Santa Fé	7,026	23.38	+.03	30.00	30.21	15	29.80	30	0.41	72.8		95.0	6	88.0	47.3	29	57.7	47.7							2.12	— 0.75					9			
Fort Apache	5,020	25.08	+.02	29.98	30.13	15	29.78	3	0.35	60.8	+ 2.8	80.0	5	72.0	38.0	28	51.9	42.0	27.0	29	13.5	24	59.6	45.0	2.41	+ 0.90	2,958	e.	28	sw.	12	12	3	14	13
Fort Bowie										66.8	+ 3.8	92.5	7	81.1	44.5	28	53.8	48.0	38.4	28	12.3	12	68.6	55.1	2.23	+ 0.45	4,377	e.	30	sw.	11	10	5	10	15
Fort Grant	4,910	25.23	—.02	29.92	30.03	10	29.77	3	0.26	70.8		86.8	7	79.0	59.0	15	62.7	27.8							2.71	+ 1.94					6			
Fort McDowell										70.6	+ 0.6	88.9	7	81.6	56.7	29	61.4	32.2	26.3	29	11.5	12	44.1	46.4	4.20	+ 2.74	4,089	n.	32	se.	5	8	4	11	15
Fort Thomas	2,710									84.4		107.0	7	96.9	60.0	31	71.9	47.0							4.11	+ 2.49		w.			6			
Prescott	5,389	24.78	+.02	29.96	30.08	21	29.72	3	0.36	76.3		99.4	7	89.1	47.8	3	63.6	25.5	45.4	3	14.9	8			3.87	+ 3.23		sw.			8			
San Carlos										65.5	+ 2.5	87.0	7	78.4	46.0	27	53.2	41.0	36.7	2	8.0	20	70.0	54.6	4.88	+ 3.80	3,902	sw.	32	sw.	4	6	4	8	18
Willcox										74.7		99.5	7	91.6	42.0	26	57.5	57.5	53.0	3	15.0	4			0.88	+ 0.10		se.			5			
Yuma	141	29.66	+.01	29.77	29.89	20	29.54	3	0.35	71.6		96.1	7	86.3	48.0	29	56.9	48.1							2.96	+ 1.98		n.			7			
Keeler	3,622	26.28		29.82	30.06	13	29.34	3	0.72	84.7	+ 1.7	105.4	29	99.1	62.5	1	69.8	42.9	40.0	2	14.6	20	56.1	64.8	1.09	+ 1.03	3,421	s.	38	s.	19	2	2	4	24
Middle plateau.										72.3		91.6	28	84.4	53.6	22	59.1	38.0	32.3	19	13.5	18	33.3	38.7	1.08	+ 1.08	3,928	e.	40	se.	6	2	0	5	25
Fort Bidwell	4,615	25.42		30.02	30.31	13	29.67	6	0.64	62.9	+ 1.4														0.53	— 0.05								
Winnemucca	4,358	25.64	+.02	29.95	30.28	13	29.63	6	0.65	59.2		85.2	15	75.4	28.6	12	42.3	56.6	43.2	20	21.9	18	62.7	45.5	0.05	— 0.45	4,476	w.	42	sw.	7	2	2	8	20
Frisco	6,406	23.78		29.86	30.16	13	29.44	3	0.72	60.2	+ 0.2	88.4	6	78.1	28.0	1	40.1	60.4	50.6	2	20.6	23	34.5	27.0	0.35	+ 0.05	5,219	e.	34	w.	18	4	4	3	23
Salt Lake City	4,345	25.65	+.01	29.93	30.27	13	29.47	3	0.80	63.8		80.7	29	73.2	37.0	1	52.2	43.7	35.5	1	14.8	30	29.0	28.4	0.28	+ 0.19	7,983	sw.	53	sw.	18	1	2	5	23
Montrose	5,780	24.37		29.94	30.21	13	29.61	3	0.60	65.7	+ 2.7	89.9	6	78.6	39.5	15	52.4	50.4	37.8	5	15.4	19	44.1	41.6	0.55	— 0.41	3,723	nw.	32	nw.	12	4	1	8	21
Fort Bridger	6,643	23.58		29.98	30.28	13	29.56	3	0.72	60.9		84.3	3	74.9	37.8	13	48.5	46.5	35.8	10	13.5	20	53.7	42.7	1.50	+ 0.76	3,955	se.	30	ne.	23	7	2	10	19
Northern plateau.										55.4		78.1	7	71.1	30.2	2	36.5	47.9	43.7	3	25.4	21	47.7	35.0	0.41	— 0.30	5,420	w.	54	sw.	7	4	4	11	15
Boisé City	2,750	27.18	+.01	29.98	30.27	13	29.65	18	0.62	60.4	+ 2.6														0.59	— 0.06								
Ashland										63.2	+ 4.2	93.4	6	81.3	33.2	4	45.0	60.2	50.7	25	24.2	8	45.8	38.7	0.14	— 0.37	739	nw.	25	w.	3	1	2	8	20
Fort Klamath										61.5		94.0	27	78.9	34.0	20	44.0	60.0	45.0	15	18.0	8			0.66	— 0.49		w.			5			
Lakeview										51.4		84.0	27	72.5	17.0	19	30.2	67.0	55.0	15	17.0	4			0.34	— 0.22		w.			3			
Linkville										58.2		83.8	15	74.5	28.1	12	42.0	55.7	43.2	13	17.5	4			0.09	— 0.56		w.			2			
Spokane Falls	1,900	27.99	+.04	30.02	30.33	26	29.68	7	0.65	56.7	— 0.3	84.1	28	70.6	31.7	22	42.6	52.4	43.5	23	7.6	1	70.6	46.2	0.05	— 0.24		n.			3			
Walla Walla	1,018	28.93		30.02	30.26	26	29.68	18	0.58	61.2	+ 3.9	84.1	28	73.8	37.6	20	50.7	46.5	34.0	23	12.6	18	57.6	44.7	1.29	— 0.00	1,529	sw.	7	sw.	8	8	8	11	11
N. Pac. coast region.										56.2	— 0.3														1.55	+ 1.49	3,616	sw.	26	sw.	13	7	4	11	15
Fort Canby	179	29.82	+.03	30.02	30.30	12	29.74	29	0.56	55.4	+ 0.1	78.0	27	61.7	45.9	19	51.6	32.1	23.6	26	2.8	7	88.1	51.8	2.85	— 0.60								
Neah Bay										54.0		80.0	7	62.1	30.5	20	45.1	31.5							3.63	— 0.37	6,235	n.	58	s.	30	8	7	12	11
Olympia	36	30.00	+.01	30.04	30.29	12	29.73	30	0.56	56.0	0.0	82.8	6	67.5	34.2	17	45.3	48.6	41.0	27	8.2	8	81.5	49.9	3.80	— 0.57		nw.			10	0	2	7	11
Port Angeles	14	30.00		30.02	30.27	14	29.69	30	0.58	51.5	— 2.5	73.3	6	59.6	32.2	20	43.6	41.1	24.9	27	6.9	30	89.9	48.0	3.34	+ 0.26	1,810	n.	17	w.	2	7	5	14	11
Tatoosh Island	86	29.93		30.03	30.29	13	29.65	30	0.64	52.6	— 1.4	69.6	6	58.1	42.6	20	48.3	27.0	20.2	6	5.6	30	91.9	50.2	1.15	— 1.23	3,084	s.	23	w.	2	4	8	15	7
Astoria		30.01								56.9	+ 1.6	80.0	27	64.3	47.3	19	52.2	32.7	22.6	26	4.0	1	81.1	51.0	3.43	— 3.67	7,206	sw.	42	se.	30	10	8	16	6
Portland	88	29.94	+.01	30.03	30.34	12	29.75	6	0.59	59.6	— 0.4	86.6	27	71.9	40.3	17	49.3	46.3	36.0	15	7.6	8	73.6	50.2	4.82	— 0.11	4,359	sw.	30	sw.	11	11	10	9	
Roseburg	523	29.47	—.01	30.03	30.33	12	29.78	29	0.55	61.5	+ 0.5	95.1	27	77.2	36.3	19	45.1	58.8	47.3	27	12.5	3	00.2	45.5	3.06	+ 1.24	3,146	nw.	24	nw.	7	8	6	11	13
Mid. Pac. coast reg.										67.0	— 0.5														0.51	— 0.35	2,285	w.	24	s.	30	6	5	7	18
Red Bluff	342	29.54	—.02	29.88	30.04	30	29.67	17	0.37	69.1	+ 2.7														0.12	— 0.25								
Sacramento	64	29.82	—.02	29.87	30.04	7	29.65	4	0.39	70.4	+ 5.4	101.3	14	90.0	48.5	20	60.1	52.8	39.8	20	14.7	4	32.5	42.2	0.06	— 0.64	4,946	n.	36	n.	12	3	1	7	22
San Francisco	60	29.88	—.01	29.92	30.09	30	29.71	4	0.38	70.4	+ 2.4	100.0	15	86.3	45.7	19	55.3	54.3	39.5	15	16.2	6	53.3	50.9	0.02	— 0.25	4,052	nw.	24	sw.	29	1	0	7	23
S. Pac. coast region.										60.4	+ 0.4	89.0	26	70.6	49.9	10	53.4	39.1	29.3	26	6.6	29	75.0	51.6	0.29	+ 0.14	6,187	w.	35	w.	1	5	2	11	17
Fresno		29.55		29.86	30.04	30	29.65	4	0.39	67.0	— 0.5														0.09	— 0.01								
Los Angeles	339	29.54	.00	29.88	29.98	21	29.73	3	0.25	75.2		104.0	15	92.4	47.0	5	56.8	57.0	44.5	28	23.0	22	49.1	52.5	0.49		3,040	nw.	20	s.	5	2	1	1	28
San Diego	66	29.84	.00	29.88	29.98	29	29.76	3	0.22	68.2	+ 0.2	91.0	11	81.6	49.2	8	57.2	41.8	30.8	19	11.1	4	82.0	61.8	0.18	+ 0.02	3,748	w.	24	w.	13	1	3	12	15
										65.7	— 1.3	79.4	21	70.9	58.0	7	61.4	21.4	16.0	10	7.0	2	83.7	60.4	tra'e	— 0.04	4,479	nw.	24	sw.	11	0	2	23	5

NOTE.—The data at Mount Washington, N. H., Pike's Peak, Colo., and stations having no departures are not used in computing the district averages.

a Record for 29 days.

Meteorological record of voluntary observers and Army post surgeons, September, 1887.

The maximum and minimum temperatures at stations marked thus (*) are from readings of other than standard instruments.

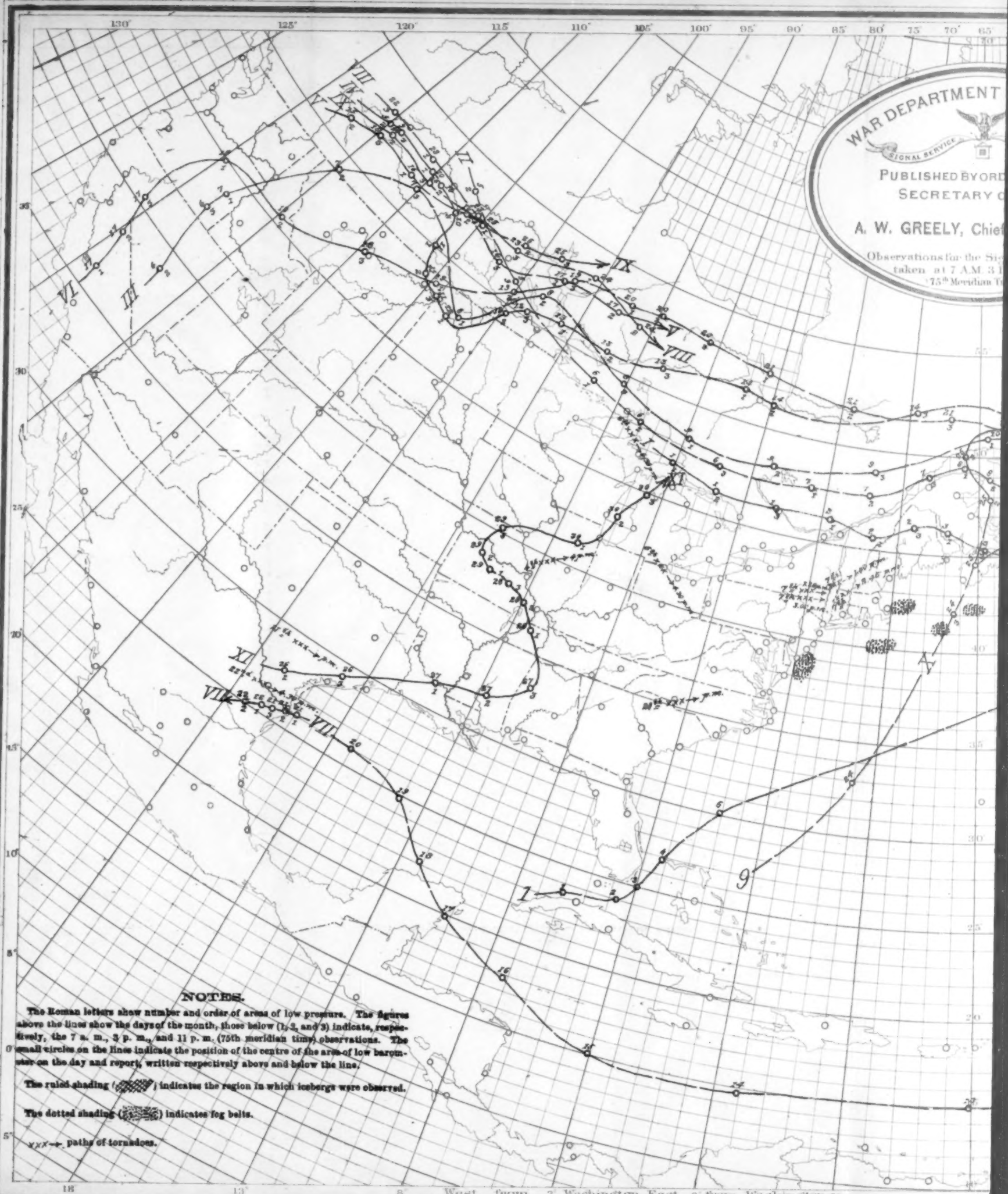
Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Alabama.	°	°	°	*Inches*
Livingston	93	58	77·7	3·43
Mt. Vernon B'ks	102	52	78·5	4·84
Arizona.				
Huachuca, Fort	90	51	66·5	3·48
McDowell, Fort	107	60	86·6	8·23
Mojave, Fort	109	35	83·8	.....
Tucson	.....	.....	.....	2·08
Arkansas.				
Hot Springs	99	51	75·0	1·68
Lead Hill	104	43	72·8	4·69
British Columbia.				
New Westminster	76	35	57·4	2·28
California.				
Alcatraz Island	83	50	56·8	0·16
Anderson *	96	48	59·4	0·15
Angel Island	85	47	58·9	0·11
Benicia Barracks	95	53	67·6	0·42
Bidwell, Fort	96	31	61·6	0·03
Gaston, Fort	96	30	65·1	2·50
Hydesville	.....	.....	.....	0·23
Lewis Creek *	100	56	78·7	0·00
Mason, Fort	75	53	60·0	0·78
Nicolaus *	100	54	70·9	0·01
Oakland	82	48	60·7	0·27
Oroville *	96	53	75·2	0·15
Presidio of San F	69	44	60·3	1·40
Poway *	93	57	68·0	0·63
Riverside	98	48	73·3	0·00
Sacramento	96	42	65·2	0·06
Salinas	78	47	58·1	0·71
Santa Barbara	81	51	66·0	.....
Willows	100	43	73·7	T
Colorado.				
Grand Junction*	90	38	62·9	1·93
Lewis, Fort	80	21	57·2	2·62
Connecticut.				
North Colebrook*	76	30	52·6	1·61
Southington	82	28	58·3	0·46
Voluntown*	79	30	58·9	3·57
Dakota.				
A. Lincoln, Fort	90	30	59·2	1·68
Henry*	80	29	57·1	1·35
Highmore	92	29	58·5	4·61
Meade, Fort	87	34	60·6	1·10
Parkston *	93	32	63·4	0·75
Pembina, Fort	87	18	54·3	0·55
Randall, Fort	94	18	61·3	1·68
Sisseton, Fort	80	28	57·1	1·02
Sully, Fort	95	33	63·4	0·20
Totten, Fort	81	28	56·3	0·54
Webster	90	32	57·9	0·88
Yates, Fort	87	38	61·4	1·72
District of Columbia.				
Distribut'g res'v'r *	86	44	66·6	3·00
Receiving res'v'r*	86	41	66·8	3·09
Wash. Aqued't Off*	91	45	69·5	.....
Florida.				
Alva *	93	65	76·1	7·88
Archer*	93	62	79·0	2·51
Duke	94	69	77·1	4·93
Fort Meade *	93	65	79·0	6·27
Homeland *	92	62	80·1	2·80
Limona *	93	68	78·6	4·26
Manatee *	94	64	81·2	5·97
Merritt's Island	92	69	78·7	11·96
Fort St. Augustine	90	68	77·8	7·80
Tallahassee *	93	56	77·5	4·25
Georgia.				
Athens	95	40	71·3	1·47
Forsyth *	101	52	76·5	3·57
Milledgeville *	93	47	73·3	1·47
Quitman	97	54	76·8	1·35
Idaho.				
Boisé Barracks	93	56	64·2	0·00
Lewiston	94	39	.....	1·66
Sherman, Fort	79	30	55·2	1·96
Illinois.				
Collinsville	97	58	77·5	3·33
Charleston *	101	52	67·5	3·32
Genoseo *	94	34·8	59·5	2·95
Mattoon	99	34	67·3	3·10
Pekin *	95	33	67·9	3·40
Peoria	98	41	68·6	2·53
Riley	86	37	59·3	4·61
Rockford	86	37	60·5	3·75
Sandwich *	96	45	65·6	3·62
South Evanston	91	35	.....	3·55
Sycamore	91	28	60·8	3·27
Windsor	95	33	68·1	3·79
Indiana.				
Butlerville*	97	33	69·0	3·18
Jeffersonville	94	38	67·8	3·27
Laconia	99	39	69·3	2·88
Indiana—Con'd.				
Logansport *	96	34	66·7	2·50
Maurzy	92	25	58·2	2·38
Sunman *	92	30	66·6	3·42
Vevay	95	36	68·5	3·39
Indian Territory.				
Gibson, Fort	95	48	72·7	3·18
Reno, Fort	97	45	70·1	5·13
Supply, Fort	97	38	.....	2·24
Iowa.				
Bancroft *	88	32	59·8	6·89
Cedar Rapids *a*	90	30	47·8	4·93
Cedar Rapids *b*	93	32	62·0	4·82
Clinton	92	30	62·2	4·44
Cresco	86	35	58·0	7·50
Des Moines	93	38	64·3	.....
Fort Madison	95	36	66·1	3·65
Humboldt	89	30	.....	6·75
Independence *	81	38	60·5	12·87
Logan *	93	36	66·4	4·20
Monticello *	88	31	61·0	6·31
Mount Vernon *	93	39	64·9	5·87
Muscatine	98	37	50·4	3·49
Oskaloosa *	93	40	.....	.....
Webster City	90	40	60·0	11·32
Kansas.				
East Norway *	94	43	67·0	6·00
Elk Falls	.....	.....	.....	4·48
Emporia	92	43	67·1	6·00
Globe *	94	46	68·4	4·91
Hays, Fort	99	30	67·8	3·34
Independence	99	52	69·8	3·82
Lawrence	94	44	67·6	5·73
Lebo	99	44	68·3	3·67
Manhattan	96	42	67·8	6·33
Morse*	92	44	68	4·88
Ninnescah	.....	.....	.....	1·11
Riley, Fort	94	42	69·3	4·75
Salinas *	84	55	71·2	3·50
Wakefield*	97	47	69·6	9·43
Wellington	95	43	73·2	2·50
W. Leavenworth*	94	49	.....	9·50?
Wilson	97	40	67·7	3·22
Yates Centre	102	43	64·4	3·58
Kentucky.				
Bowling Green*	102	45	73·6	3·73
Frankfort *	96	34	69·3	5·68
Louisiana.				
Grand Coteau	93	56	77·1	4·57
Liberty Hill *	90	.....	.....	2·74
Maine.				
Bar Harbor	76	38	57·0	6·60
Cornish	77	36	55·2	0·67
Gardiner *	75	35	55·0	1·05
Kent's Hill	74	34	54·2	.....
Orono *	77	31	54·5	0·95
Skowhegan	76	30	54·0	1·70
Maryland.				
Cumberland	82	36	61·9	3·68
Fallston	83	38	61·6	4·26
Great Falls *	88	43	65·7	3·03
McDonogh	82	42	63·1	4·09
McHenry, Fort	84	42	63·4	1·57
New Midway*	84	34	62·3	4·18
Woodstock	85	34	62·2	4·12
Massachusetts.				
Amherst	86	30	55·9	1·22
Blue Hill Obs'ya	77	36	56·5	1·00
Blue Hill Obs'yb	79	36	.....	1·36
Deerfield	81	39	56·1	1·79
Dudley	80	33	59·8	1·84
Fall River	74	38	57·8	1·30
Milton	79	36	56·0	1·63
New Bedford	75	38	58·4	1·68
Newberryport	81	36	57·5	1·76
North Truro	.....	.....	.....	0·28
Somerset	84	38	62·1	1·46
Taunton	83	32	58·5	1·71
Westborough*	84	32	59·5	1·35
Williamstown	78	32	55·0	2·30
Michigan.				
Birmingham	89	29	.....	4·32
Brady, Fort	85	27	53·9	1·86
Harrisville*	87	29	56·5	1·34
Hudson	89	24	58·6	4·26
Kalamazoo	84	41	62·5	4·09
Lansing	87	27	58·7	5·53
Marshall *	87	38	57·1	3·84
Mottville *	89	32	64·0	3·68
Thornville *	90	33	58·6	3·44
Traverse City	87	27	57·0	0·61
Minnesota.				
Minneapolis *	83	37	57·2	4·17
Snelling, Fort	83	30	56·5	3·33

Meteorological record of voluntary observers, etc.—Continued.

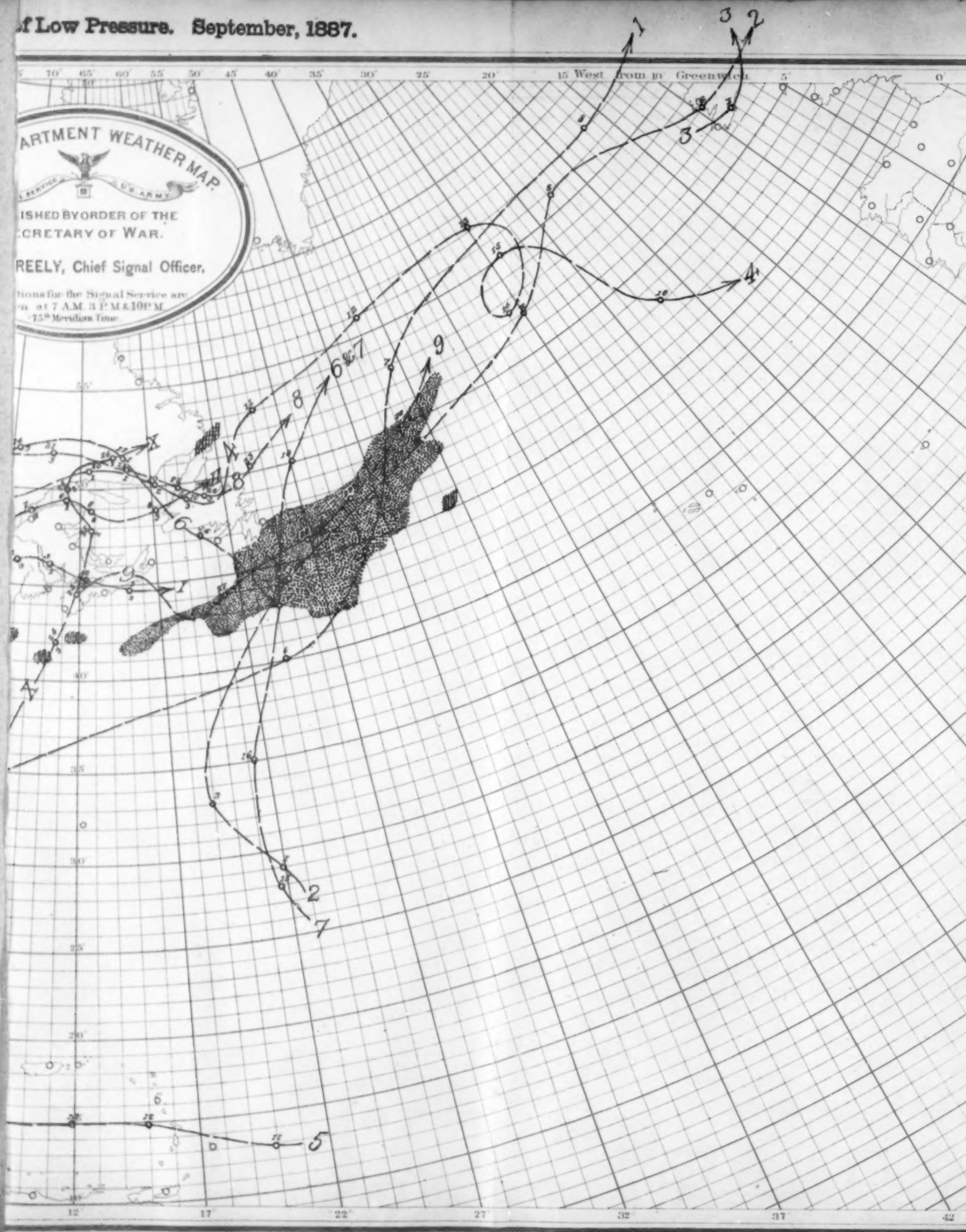
Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation.
Missouri.	°	°	°	*Inches*
Conception	90	39	64·7	5·18
Fayette *	100	34	69·1	3·73
Montana.				
Keogh, Fort	90	38	63·7	1·74
Missoula, Fort	80	29	55·6	0·36
Shaw, Fort	89	27	57·8	0·36
Nebraska.				
Brownville *	96	42	70·0	5·36
Crete *	94	40	64·9	2·30
De Soto *	93	36	64·3	2·80
Fairbury	.....	.....	.....	1·35
Fremont *	89	35	64·4	1·69
Genoa	90	40	63·4	11·34
Harvard	90	38	63·9	4·50
Hay Springs	87	31	58·9	0·78
Marquette *	87	.....	.....	2·57
Niobrara, Fort	91	30	63·1	1·16
Robinson, Fort	92	31	63·4	0·10
Sidney, Fort	93	34	61·8	4·04
Tecumseh *	92	39	67·0	4·87
Nevada.				
Carson City	86	31	59·0	0·11
McDermit, Fort	88	29	57·8	0·22
New Hampshire.				
Antrim	.....	.....	.....	1·11
Ashland	.....	.....	.....	1·29
Belmont	.....	.....	.....	1·08
Berlin Mills	81	21	.....	1·18
Bristol	.....	.....	.....	1·21
Concord	81	30	57·2	0·93
Lake Village	.....	.....	.....	2·02
Nashua	84	30	56·9	1·18
Wier's Bridge	.....	.....	.....	1·28
Wolfeborough	.....	.....	.....	2·18
Woodstock	.....	.....	.....	1·70
New Jersey.				
Beverly	86	38	62·4	5·27
Clayton *	89	38	62·4	5·40
Dover	82	32	58·3	1·94
Egg Harbor City	85	36	61·4	5·70
Moorestown	81	39	61·5	6·09
Readington *	84	40	64·4	.....
Roseland *	82	30	.....	2·35
Salem *	90	41	62·8	4·88
South Orange	84	44	61·2	1·80
Vineland	83	40	61·8	5·20
New Mexico.				
Bayard, Fort	95	52	69·9	4·30
Gallinas Springs	.....	48	.....	3·62
Selden, Fort	94	48	74·2	1·94
Union, Fort	87	33	59·8	0·90
Wingate, Fort	82	43	59·9	3·26
New York.				
Ardenia	82	41	59·0	1·06
Auburn	76	37	57·8	0·93
Boyd's Corners	82	38	.....	1·90
Brooklyn	84	42	.....	.....
Columbus, Fort	80	42	63·0	2·17
Cooperstown*	73	33	54·7	1·42
Factoryville *	81	30	55·9	2·57
Humphrey	84	30	57·9	3·09
Ithaca	80	34	56·6	1·95
Le Roy	86	32	57·3	1·62
Madison Barracks	79	35	59·0	1·12
Menands *	76	41	58·3	1·57
Niagara, Fort	87	36	60·2	0·38
North Volney	78	40	57·3	.....
Palermo	75	33	54·7	2·33
Plattsburg B'ks	83	34	57·7	0·51
Palmyra *	83	39	60·2	.....
Penn Yan	.....	.....	.....	1·99
Saratoga Springs	81	33	.....	1·02
Setauket	78	42	61·6	2·45
Starkey	85	44	61·6	3·72
Utica	82	17	51·2	.....
West Point	84	34	60·3	1·90
White Plains	78	38	61·2	2·15
North Carolina.				
Chapel Hill	96	36	69·2	1·39
Hot Springs	87	39	69·5	.....
Lenoir *	85	41	65·7	3·40
Lincolnton	82	39	60·2	2·66
Marion	90	33	68·2	5·41
Reidsville *	94	33	69·6	2·95
Raleigh *	96	43	71·0	1·80
Statesville *	90	40	67·9	3·65
Weldon *	95	40	68·8	3·49
Ohio.				
Cleveland	93	36	60·6	3·78
College Hill*	102	40	67·2	1·75
Elyria	94	35	70·7	3·07
Garrettsville	92	30	57·5	4·70
Hiram	90	30	59·9	3·74
Jacksonborough *	96	36	63·0	1·45
Napoleon	89	29	62·3	1·12
North Lewisburg	94	35	65·9	2·05
Portsmouth	94	38	65·2	2·09
Ohio—Con'd.				
Ruggles*	90	38	60·4	2·35
Tiffin *a*	90	34	62·2	1·36
Tiffin *b*	92	35	62·4	1·81
Wauseon	95	25	61·6	1·70
West Milton *	97	33	64·0	3·00
Yellow Springs	92	30	64·5	1·48
Oregon.				
Albany *	89	40	60·2	1·67
Bandon *	71	37	51·6	1·15
East Portland*	90	38	.....	4·06
Eola *	86	39	58·3	1·87
La Grande	82	33	.....	0·55
Mount Angel	89	46	60·5	2·35
Klamath, Fort	87	13	54·9	0·32
Yaquima L. H.	.....	40	.....	2·57
Pennsylvania.				
Altoona	83	36	62·1	2·96
Bethlehem *	84	34	60·4	2·78
Blooming Grove *	85	28	58·8	2·00
Catawissa	82	35	.....	5·14
Corry *	92	24	57·1	3·49
Drifton	83	32	56·2	2·37
Dyberry	78	27	54·7	2·18
Easton	.....	.....	.....	3·24
Fallsington *	85	41	60·2	4·14
Franklin *	84	36	55·0	2·44
Germantown	.....	.....	.....	4·48
Grampian Hills	86	30	59·0	3·50
Indiana	80	40	64·1	.....
Meadville	92	49	66·0	.....
Phillipsburg *	82	24	55·0	4·60
Quakertown *	84	33	58·4	3·52
State College	82	32	59·4	3·69
Wellsborough *	78	32	56·1	2·42
West Chester	84	37	61·3	5·67
Wilkesbarre	84	31	58·8	1·48
South Carolina.				
Kirkwood	.....	40	.....	0·80
Stateburg *	93	43	71·3	0·75
Spartanburg	94	45	70·2	2·41
Tennessee.				
Ashwood	97	45	72·8	2·58
Austin *	99	42	77·4	2·62
Milan	100	44	71·0	2·57
Texas.				
Austin *	96	52	73·8	2·82
Cleburne *	90	50	73·2	4·06
Concho, Fort	98	45	76·7	2·87
Corsicana	.....	.....	.....	4·37
McIntosh, Fort	96	55	80·4	3·72
Midland *	95	42	74·6	0·25
New Ulm	98	52	74·8	3·20
Ringgold, Fort	101	59	80·0	6·20
Silver Falls	93	41	71·7	1·19
Vermont.				
Burlington	.....	.....	.....	2·01
Brattleborough *	85	30	56·3	0·91
Lunenburg	80	36	58·0	1·02
Newport *	76	36	55·4	1·92
Stratford *	76	38	56·5	1·70
Virginia.				
Bird's Nest *	89	45	69·1	1·85
Dale Enterprise*	92	31	68·3	3·58
Marion *	85	30	62·0	3·46
Monroe, Fort	90	45	69·9	2·48
Rappahannock	98	34	75·7	.....
Summit*	89	31	64·2	.....
University of Va	77	49	62·8	2·58
Variety Mills	93	31	63·3	2·73
Wytheville	87	32	63·1	4·88
Washington Territory.				
Blakely *	78	40	57·2	2·81
Kennewick*	85	34	.....	0·25
Spokane, Fort	88	31	57·5	1·24
Tacoma *	76	42	57·9	2·35
Townsend, Fort	79	38	56·3	0·95
Vashon	75	44	55·4	1·85
Walla Walla, Fort	86	36	62·1	0·57
West Virginia.				
Clarksburg *	88	30	73·0	2·51
Helvetia *	88	30	60·3	3·49
Middlebrook *	80	30	55·8	.....
Parkersburg	92	40	65·6	2·77
Wisconsin.				
Beloit	.....	.....	.....	5·17
Delavan	80	32	56·9	4·29
Embarras *	78	34	59·2	5·30
Franklin	93	63	72·0	4·00
Lancaster *	87	31	59·6	5·55
Manitowoc	77	32	58·6	4·74
Madison	83	43	59·2	6·67
Prairie du Chien	89	38	60·0	9·51
Wyoming.				
Laramie, Fort	87	30	59·4	0·04
Camp Sheridan	86	29	53·0	0·60
McKinney, Fort	88	32	61·4	0·80
Washakie, Fort	84	25	59·8	0·35

Form 106 G 1884.

Chart I. Tracks of Areas of Low Pr



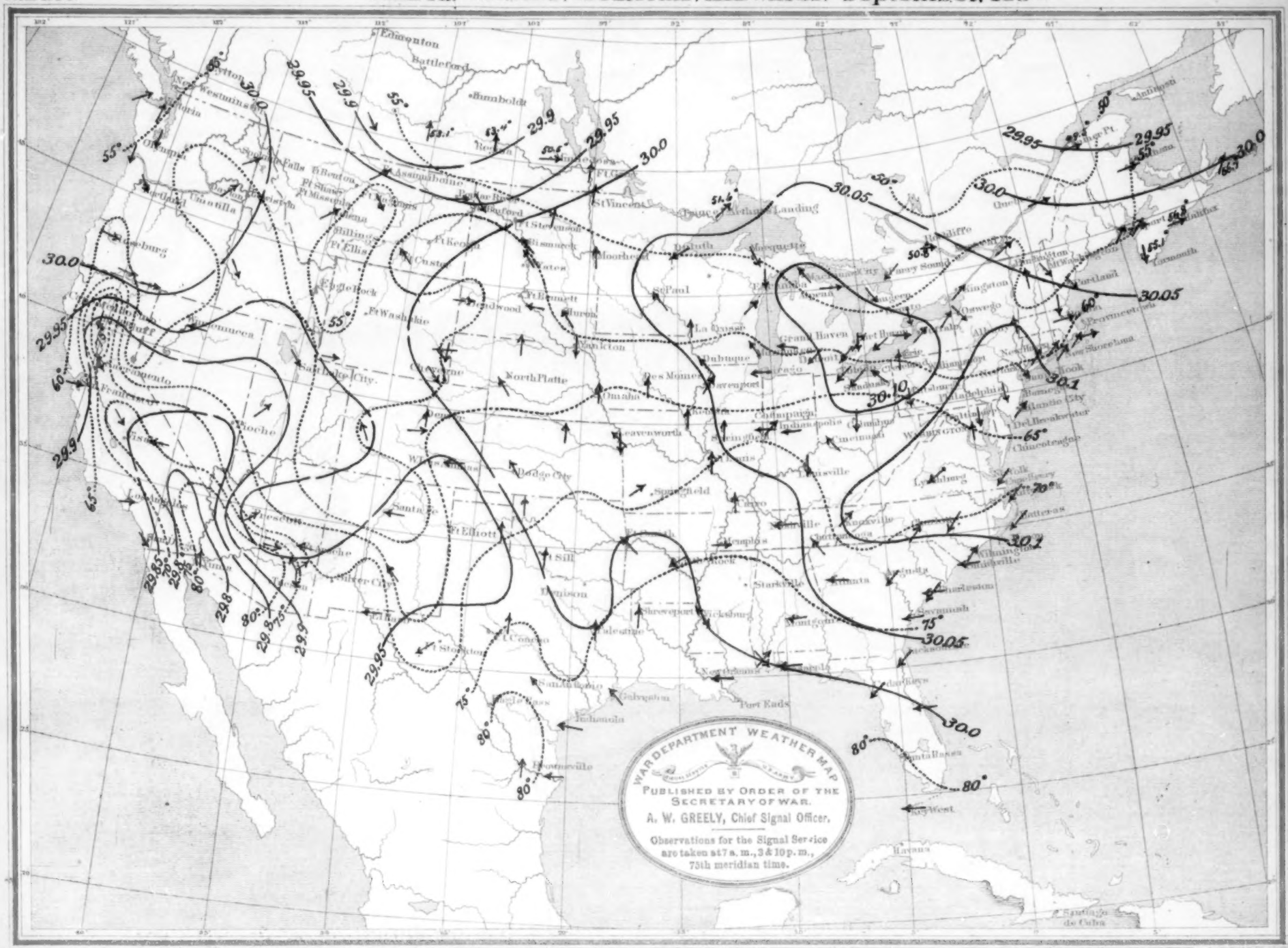
f Low Pressure. September, 1887.



Signal Office Lith.

Form 106 F.

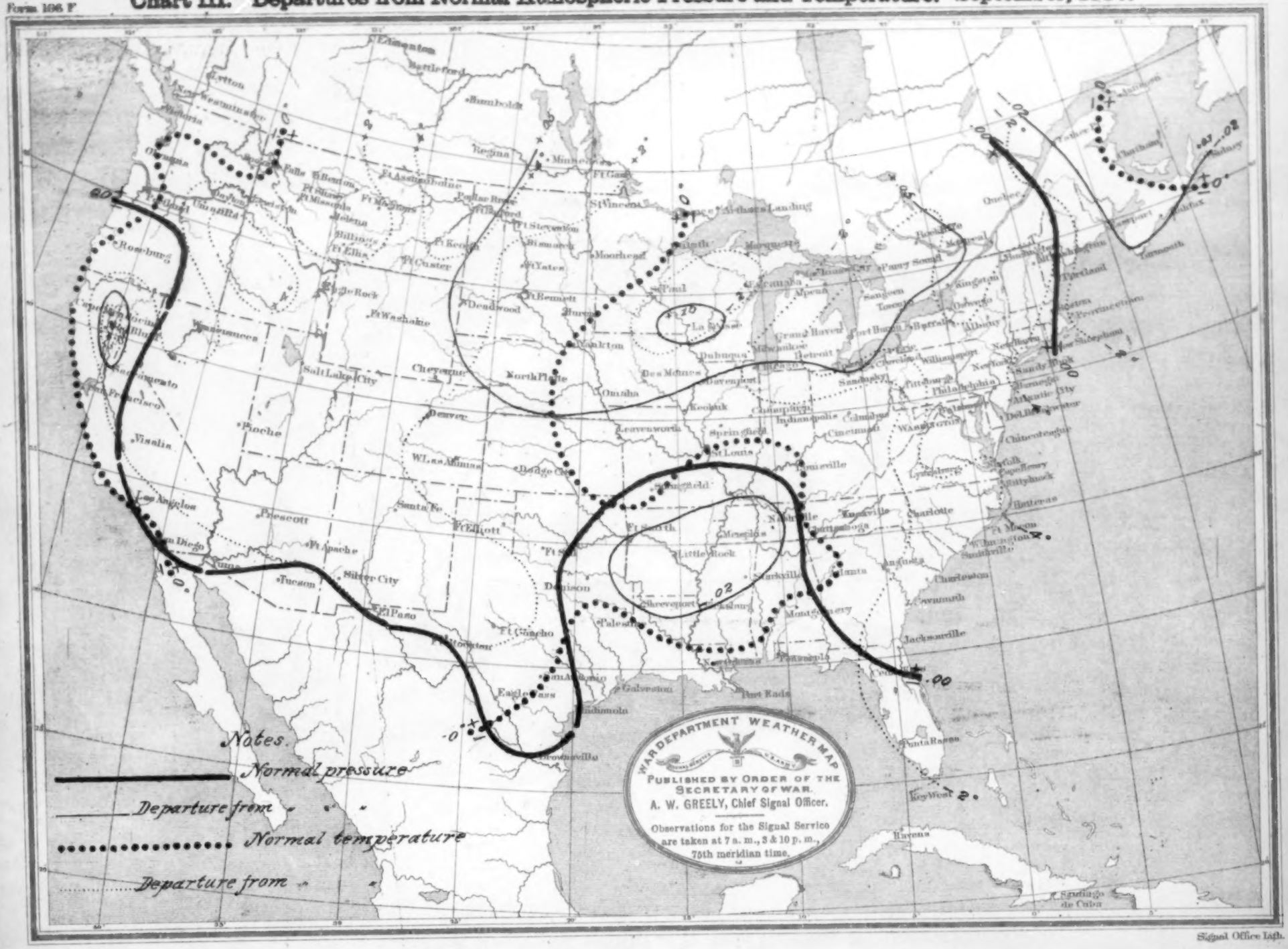
Chart II. Isobars, Isotherms, and Winds. September, 1887.


WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

Signal Office Lith.

Form 196 F

Chart III. Departures from Normal Atmospheric Pressure and Temperature. September, 1887.


Notes.
Normal pressure
Departure from " "
Normal temperature
Departure from " "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

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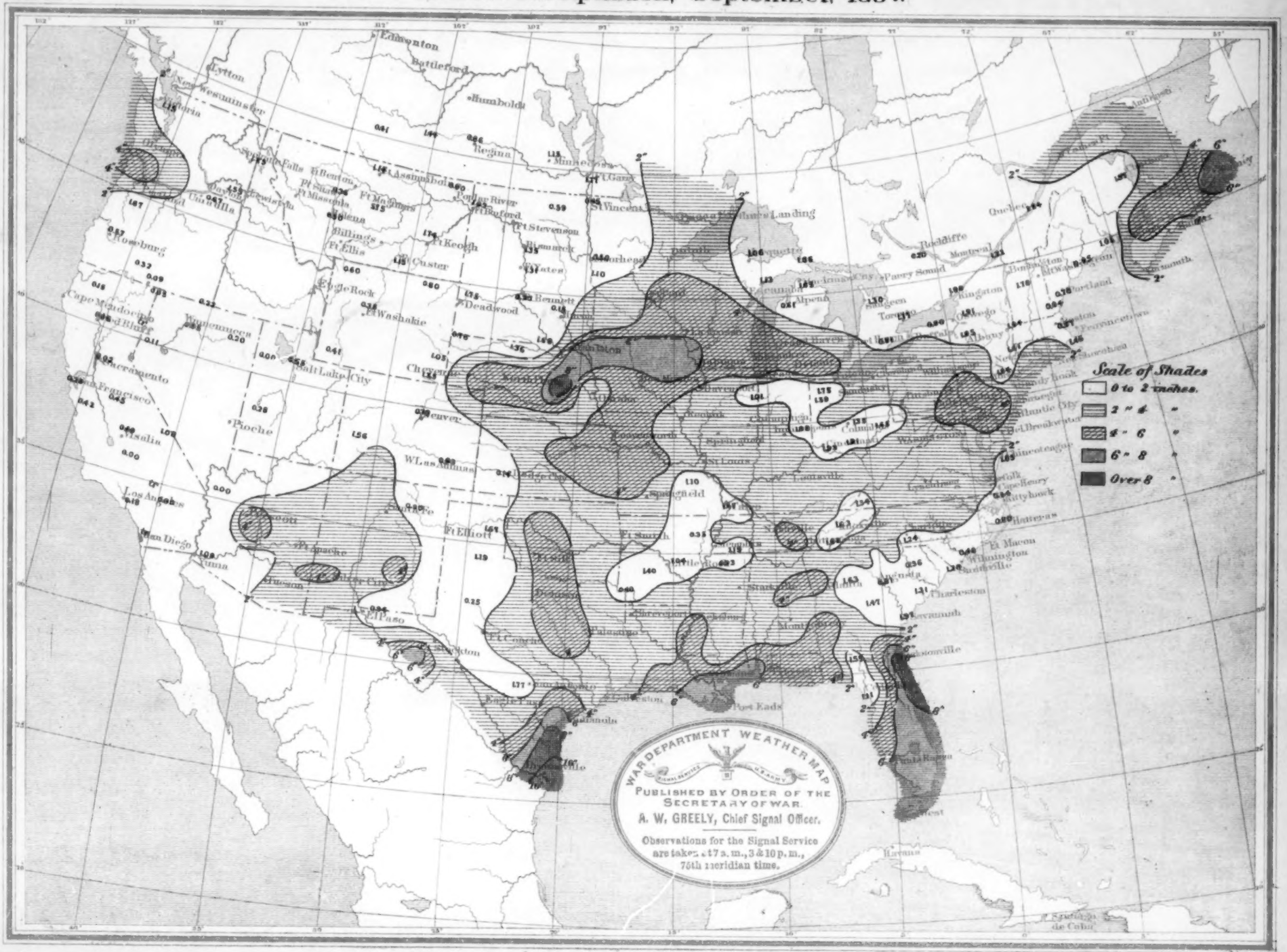
Form 106 F.

Chart IV. Precipitation, September 1887.


Scale of Shades
0 to 2 inches.
2 " 4 "
4 " 6 "
6 " 8 "
Over 8 "
WAR DEPARTMENT WEATHER MAP
PUBLISHED BY ORDER OF THE SECRETARY OF WAR.
A. W. GREELY, Chief Signal Officer.
Observations for the Signal Service are taken at 7 a. m., 3 & 10 p. m., 75th meridian time.

Signal Office Lith.

Voluntary observers of the Signal Service, on land, from whom meteorological reports were received in time to be used in the preparation of the Monthly Weather Review for September, 1887.

Observer and place of observation.

Alexander, S., Birmingham, Mich.
Acosta, L. P., "Director," Mazatlan, Mex.
Anderson, Dr. W. W., Stateburg, S. C.
Altaffer, J. M., Independence, Kans.
Abbott, Dr. E. K., Salinas, Cal.
Arents, Hiram, Oroville, Cal.
Adams, A. H., Fort Meade, Fla.
Adams, Dr. O. H., Vineland, N. J.
Andrews, Luman, Southington, Conn.
Arden, Richard B., Garrison's, N. Y.
Boynton, J. F., Syracuse, N. Y.
Beans, Thos. J. Moorestown, N. J.
Bell, Joseph, Franklin, Pa.
Boerner, Prof. Chas. G., Vevay, Ind.
Bently, David, Willows, Cal.
Bayerly, J. F., Spartanburg, S. C.
Ballou, Dr. N. E., Sandwich, Ill.
Bennett, Geo., Bandon, Oregon.
Boies, Lt. A. H., Hudson, Mich.
Baker, Dr. Henry B., Lansing, Mich.
Beall, Dr. R. L., Lenoir, N. C.
Brendel, Dr. Fred., Peoria, Ill.
Bartlett, E. B., Vermillion, N. Y.
Briggs, John. Albany, Oregon.
Betts, Prof. Arthur, Webster, Dak.
Breed, J. E., Embarras, Wis.
Beloit College, Observatory, Beloit, Wis.
Birt, Thomas, Utica, N. Y.
Broberg, Mrs. Mary W., Manatee, Fla.
Black, W. H., Kalamazoo, Mich.
Biachly, C. P., Manhattan, Kans.
Bridges, Q. A., Berlin Mills, N. H.
Bowman, Peter, Ruggles, Ohio.
Boyd, Joseph, Oskaloosa, Iowa.
Cook, S. A., Milledgeville, Ga.
Carrington, G. D., Brownville, Nebr.
Calhoun, P. B., Austin, Tenn.
Carpenter, Dr. W. B., Leavenworth, K.
Charbonnier, Prof. L. H., Athens, Ga.
Chapin, Adams, Poway, Cal.
Casey, Geo., Auburn, N. Y.
Crawford, E. A., Liberty Hill, La.
Cornell University, Ithaca, N. Y.
Collin, Prof. Alonzo, Mount Vernon, Iowa.
Cutting, Dr. Hiram A., Lunenburg, Vt.
Clark, F. A., Weldon, N. C.
Childs, W. H., Brattleborough, Vt.
Cutler, B. B., Heath, Mass.
Collie, G. L., Delavan, Wis.
Conant Observatory, Dudley, Mass.
Cotton, Dr. D. B., Portsmouth. Ohio.
Cheney, Wm., Minneapolis, Minn.
College of Sacred Heart, Prairie du Chien, Wis.
Carter, Rev. Dr. W. H., Tallahassee, Fla.
Cummings, L. D., Palmyra, N. Y.
Crump, M. H., Bowling Green, Ky.
Crozier, Lafe, Laconia, Ind.
Cochran, Wm. P. Wakefield, Kans.
Colton, Prof. G. H., Hiram, Ohio.
Caulkins, John S., Thornville, Mich.
Chandler, Dr. W. J., South Orange, N. J.
Cass, W. Earle, Roseland, N. J.
Curtiss, G. G., Fallston, Md.
Colton, Prof. G. H., Hiram, Ohio.
Comstock, Prof. F. M., LeRoy, N. Y.
Craig, W. F., Marion, N. C.
Cutler, J. L., Quitman, Ga.
Carpenter, Ford A., Vashon, Wash.
Dollenmayer, E. Y., Wilson, Kans.
Dow, Roswell, Sycamore. Ill.
Dinsmore, Prof. F. H., Emporia, Kans.

Observer and place of observation.

Drake, W. T., Marshall, Mich.
Dudley, Chas. B., Altoona, Pa.
Dunlap, W. L., Tecumseh, Nebr.
Dazey, J. B., Charleston, Ill.
Deming, H. D., Wellsborough, Pa.
Downing, A. L., Concord, N. H.
Davis, McLean W., Indiana, Pa.
Dozier, Wm., Mattoon, Ill.
Dewhurst, Rev. E., Voluntown, Conn.
Day, Theodore, Dyberry, Pa.
Edgington, R. P., Morse, Kans.
Eliason, W. A., Statesville, N. C.
Ellis, John, Marquette, Nebr.
Ewell, Dr. M. D., South Evanston, Ill.
Evans, J. W., Alma, Colo.
Eckstein, Rev. M., Conception, Mo.
Foss, E. T., Hyd ville, Cal.
Ferris, B. F., Sunman, Ind.
Fouch, Dr. A., Andersonville, Cal.
Friend, Chas. W., Carson City, Nev.
Ferrill, B. P., Duke, Fla.
Frear, Wm., State College, Pa.
Fernald, Prof. M. C., Orono. Me.
Fleming, John, Readington, N. J.
Fuller, Edw. N., Tacoma, Wash.
Featherston, Wm., Globe, Kans.
Field, T. G., Parkersburg, W. Va.
Gibson, J. H., Salina, Kans.
Gates, W. B., Burlington, Vt.
Gray, F. R., Yates Centre, Kans.
Gillingham, Milnor, Fallsington, Pa.
Goodspeed, Chas. W., Elyria, Ohio.
Gowey, H. D., North Lewisburg, Ohio.
Green, Dr. Jesse C., West Chester, Pa.
Gerrish, S. H., Sacramento, Cal.
Goodwin, Rev. William, North Colebrook, Conn.
Gibbs, Geo. I., Grand Turk, Turk's Island, British W. Indies.
Gray, Capt. A. W., Kenewick, Wash.
Grathwohl, John, Blooming Grove, Pa.
Gore, Prof. J W., Chapel Hill, N. C.
Holt, A. K., Riverside, Cal.
Humphrey, Dr. J., Fairbury, Nebr.
Hamilton, W. H., Corsicana, Tex.
Harvard College Observatory, Cambridge, Mass.
Hammitt, John W., College Hill, Ohio.
Harris, T. C., Raleigh, N. C.
Heaton, Isaac E., Fremont, Nebr.
Hodge, Rev. F. B., Wilkesbarre, Pa.
Hoskinson, R. M., Blakely, Wash.
Hardy, Samuel E., East Norway, Kans.
Hyde, G. A., Cleveland, Ohio.
Hartzler, J. A., Mottville, Mich.
Hole, C. F., Butlerville, Ind.
Held, Rev. F. B., Mount Angel, Oreg.
Heatwole, L. J., Dale Enterprise, Va.
Hatch, A. H., Windsor, Ill.
Harris, W. C., Dover, N. J.
Hunter, Dr. T. C., Napoleon, Ohio.
Hewit, S. F. H., Middlebrook, W. Va.
Helm, Thos. B., Logansport, Ind.
Heacock, J. L., Quakertown, Pa.
Hazen, Rev. A., Deerfield, Mass.
Ireland, W. H., Rappahannock, Va.
Jessup, J. G., Newport, Oregon.
James, John W., Marengo, Ill.
Jennison, Henry L., Starkey, N. Y.
Jones, Dr. E. U., Taunton, Mass.
Jordan, Dr. M. D. L., Milan, Tenn.
Kirkwood, E., Manzy, Ind.
Knapp, J. G., Limona, Fla.
Keese, G. Pomeroy, Cooperstown, N. Y.

Observer and place of observation.

Lincoln, A. T., Marion, Va.
Loveland, Wm. Corry, Pa.
Loomis, J. C., Jeffersonville, Ind.
Logan, David, Meadville, Pa.
Luther, S. M., Garrettsville, Ohio.
Lerch & Rice, Bethlehem, Pa.
Lüps, Miss Cisinn, Manitowoc, Wis.
Loundes, R. T., Clarksburg, W. Va.
Lee, Elon, Webster City, Iowa.
Manning, Thomas, Carmel, N. Y.
Miller, H. D., Drifton, Penn.
Morgan, L. Ray, Phillipsbury, Pa.
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